580.9716
BU
v.1:1-4

BULLETIN OF THE PICTOU ACADEMY SCIENTIFIC ASSOCIATION

580.9716
BU
V.1:1-4

BIX

UNIVERSITY OF ILLINOIS
LIBRARY
AT URBANA-CHAMPAIGN
BIOLOGY

THE BULLETIN

OF THE

Pictou Academy
...Scientific Association...

....CONTENTS....

The P. A. Scientific Association.
RUSTS, with notes on some Nova
Scotian Species. . . . . . .
BOG PLANTS.
THE MOLLUSKS of Pictou County.

THE BULLETIN

OF THE

Pictou Academy
...Scientific Association...

....CONTENTS....

The P. A. Scientific Association.
RUSTS, with notes on some Nova Scotian Species. . . . . . .
BOG PLANTS.
THE MOLLUSKS of Pictou County.

THE BULLETIN.

Vol. I. Pictou Academy, November, 1906. No. 2.

THE Pictou Academy Scientific Association was instituted in 1882 and during the earlier years of its existence much valuable work was done by the various clubs of which it was composed, in making collections of the local fauna and flora and in stimulating interest among the students of the institution in Scientific work. These collections have been largely preserved in the Museum of the Academy and have been added to from time to time since. In later years, however, the laboratory classes to a great extent usurped the place of the old working clubs and the Scientific Association ceased to be a factor in the life of the Academy as a working organization. During the past session it was re-organized and in order that a record might be had of any work done by its members which might be of more general and permanent interest it was decided to publish bulletins from time to time, in which the results of such work might be preserved. The present number is the second of such publications.

Membership in the Association is open to all Academy students and alumni and to others, as associate members, who are interested in the work of the institution. A nominal fee of fifty cents per annum is exacted of members who wish to receive copies of the Bulletin as issued.

The officers for the current year are :

Hon. President:—R. MacLellan.
President—C. L. Moore.
Vice-President—A. G. Baillie.
Sec'y-Treas.—H. F. Munro.

Executive—The Officers, J. W. Mortimer, R. L. Titus and Jos. Haley

All correspondence should be addressed to H. F. Munro, Pictou Academy, Pictou, N. S.

"RUSTS,"—with notes on some Nova Scotian Species.

By C. L. MOORE, B A.

THE Uredineae (Rust fungi) are a group of fungi, parasitic on the higher plants to which they frequently prove very injurious. The spores breaking through the epidermis of various parts of the host plants, produce in many cases the characteristic rust spots which have given to the group the common name of the Rusts. These spores arise from a mycelium, the vegetative part of the parasite, which in the form of branching filamentous hyphae, grows in the intercellular spaces of the host plants and absorbs its nourishment from the surrounding cells. The forms which occur on grains, as wheat and oats, are the most generally known and a sketch of the life history of one of these will serve to illustrate that which is common to a large number of the group. One of the species infecting the grains is Puccinia graminis.

For a long time Barberry bushes were popularly supposed to be harmful to wheat fields, and in 1865 De Bary set to wark to investigate this belief. It was in this connection that he worked out the life history of this species. In May or June in countries where the barberry grows, spots appear on the leaves of the tree and in these are developed the cup-like developmental stage of the fungus—the cluster-cup stage. In the formation of these one thread of the mass of hyphae, growing in the intercellular spaces of the leaf, swells up and gives rise to a large number of branches which become the spore bearing threads.

The spores are formed basipetally by the construction from these. The first cell cut off from the tip ofeach thread does not become a functional spore, nor do any of the cells of the outer rows, but these, closely appressed together form a complete envelope around and above the true spores and constitute what is known as the peridium. All this development takes place within the tissue of the host, but finally by continued growth the epidermis is burst aside and the top of the peridium is also broken and thrown back. Thus are formed the little cups filled with chains of spores from which this stage of the fungus takes its name. In connection with the formation of these cluster-cups one may also find on the Barberry leaves, on the opposite sides, peculiar flask shaped structures from the cavities of which there radiate a great number of simple unbranched hyphae from the tip of each of which a small spore is cut off. These are the pycnidia and the spores are known as pycnospores. The cluster-cup spores, or aecidospores, germinate promptly but they are not capable of infecting a Barberry plant. They must germinate on a grass plant and when they do this they send their germ tubes into the tissue of the leaf or leaf sheath, and give rise to a mycelium of branched filamentous hyphae in the intercellular spaces of the grass. After this is well developed a large number of threads push up together towards the surface. Swelling at their tips and growing towards the stomata grooves they throw aside the epidermis. The spores formed from the enlarged tips of these branches are now mature and of a brownish or orange color. It is this spore form which has given the name "rust" family to the group. This is the red rust or Uredo spore form. These spores are thin walled and capable of germinating directly and infecting new grass or grain plants. The walls are covered with wart-like protuberances and each spore is provided with a number of germ pores through which the germ tubes grow out. They are sometimes known as the summer spores. Each sorus of spores which arises from infection by a uredospore is exactly like that arising from an aecidiospore. Later in the season, in the very same sori, one may find the threads producing another kind of spore,—the winter, or resting or teleutospores, formed in the species under consideration, in pairs. These spores are thick walled and after a period of rest, normally through the winter, they germinate, not producing a mycelium capable of infecting a new plant, but fructicatively. The germ tube which arises from one of these spores is cut up into four cells by cross walls and from each of these four cells a slender outgrowth arises at the tip of which a spore is developed. These spores are known as the basidiospores and when they germinate they attack, not a grass, but the proper host plant—the Barberry. The mycelium here produced gives rise to cluster-chps and pycnidia and the life cycle is complete. There are thus five spore forms in this life history,—pycnospores, Aecidiospores, Uredospores, Teleutospores and Basidiospores, and each, except the Uredospores, produces the next spore form in the cycle.

In the group we find multitudinous variations of this typical complete life cycle. Certain species produce only basidiospores, from germinating teleutospores, or, in addition to teleutospores, only uredospores are developed on the same host. In fact rusts are known which have the teleutospore form with any one, two, three or four other spore forms making numerous variations.

The circumstance that different stages of the same rust, as in the case of grain rust, are developed in different hosts considerably complicates the study of the life histories of the different members of the group as the connection between a cluster-cup or aecidia stage on one host and a teleutospore or Uredospore stage on another cannot be recognized without careful research.

The question may suggest itself as to how it happens that Puccinia graminis, one of our common grain rusts, appears year after year in districts such as our own where the Barberry tree is practically unknown—this tree being essential to the completion of its life cycle. In such circumstances the new infection of the grain in the spring appears to come from Uredospores which have survived the winter.

Following is an annotated list of a number of rusts collected in the vicinity of Pictou during 1905-6. With two or three exceptions they are all new to the flora of Nova Scotia.

1. **Puccinia Circaeae,** *Pers.* On Circaea alpina. The sori are arranged more or less regularly in circles on discolored spots on the leaves.

2. **Puccinia acuminata.** *Peck.* The sori form cushion-like, dark purple spots on the under sides of the leaves of Cornus canadensis. On the upper side a corresponding depression marks the position of the sorus.

3. **Puccinia cicutae** *Lasch.* On Cicuta maculata.

4. **Puccinia taraxaci,** *Plow.* On Taraxacum Officinalis.

5. **Puccinia suaveolens (Pers)** *Roste.* Appears throughout spring and summer on the under side of the leaves and on the stems of the Canada thistle. Afflicted plants appear to very rarely mature seed.

6. **Puccinia violae,** (*Schum*). **DC.** On Viola blanda and V. cucullata.

7. **Puccinia coronata Cda.** Throughout the seasons of 1905 and 1906 this appears to have been the common rust affecting oats in the vicinity of Pictou.

8. **Puccinia sessilis.** *Perse* (?) On Maianthemun canadense.

9. **Puccinia menthae P.** On Mentha canadensis.

10. **Puccinia graminis.** *Pers.* On wheat and oats.

11. **Uromyces caladii.** (*Schwein*). **Farl.** On Arisaema triphyllum.

12. **Uromyces trifolii.** (*Hedw*). **Lev.** On Trifolium pratense and T. repens.

13. **Pucciniastrium agrimoniae** (*Dc.*) **Diet.** On Agriminia eupatoria.

14. **Phragmidium subcorticum** (*Schrank*). On Rosa blanda, sori breaking through the epidermis of the leaf petioles, leaves, and calyx in orange colored masses.

15. **Triphragmium clavellosum.** *Peck.* On leaves of Aralia nudicaulis giving the leaves a much blotched spotted appearance. Previously reported only at considerable altitudes, but at Pictou occuring in localities little above sea level.

16. **Gymnoconia interstitialis,** (*Schlecht*). **Lagerh.** Sori form orange colored confluent patches on the under side of the leaves of Rubus strigosus.

17. **Coleosporium Solidaginis,** (*Schw.*) **Thum.** On Aster patens.

18. **Melampsora Medusae, Thum.** On leaves of Populus grandidentata. The areas surrounding the sori become almost coal black in color early in autumn.

19. **Peridermium balsameum.** *Peck.* The aecia are white, arranged in two irregular rows on the under side of the leaves. The whole leaf takes on a bleached appearance. I have only found this species occurring at considerable altitudes.

20. **Peridermium decolorans.** *Peck* On Picea rubra.

21. **Peridermium elatinum,** (*A. & S.*) **K. & S.** On Abries balsamea causing the formation of "witches' brooms."

The nomenclature of host plants is that of Gray's Manual 6th Ed.

BOG PLANTS.

A. G. Baillie. ('*06*).

The subject of this article was assigned to me by the President of the P. A. Scientific Association. I certainly would never have chosen it myself: yet in spite of wading through the cold water, in spite of the bloodthirsty mosquito, I found many things which interested me very much. My only regret is that I could not spend as much time on the subject as it deserved.

I confined myself mostly to a bog lying about two miles north of the Academy. This being one of the "raised" bogs presents some peculiarities in itself, which some other member might find interesting and quite worthy of separate investigation. It is situated in the woods which lie between Pictou and Carribou and its outflow finds its way to the stream which flows over Barry's Falls. At the side opposite to the outlet extends a sand beach nearly the whole length of the bog. This would show that at some time the surface of the bog was covered with water to some depth. If not, whence the beach? Whether that water was fresh or salt remains to be disclosed. The middle part of the bog is raised, I should judge, to the height of six or eight feet.

The substratum penetrated by the roots of most bog plants has a temperature below that favorable to absorption by the plant, consequently there are several means adopted by Nature to overcome this difficulty and to cause a decrease of transpiration. Some peculiarities are noticeable to the naked eye, others need the aid of a microscope.

Among the characteristics of bog plants the most noticeable are :—

1. A reduction in size of leaf, leaving less surface for transpiration.
2. The outside covering of the plant comprises a coating of wax and hairs, filled with very minute air cells.
3. The epidermal and hypodermal tissues are thick walled.
4. A difference in the shape of leaves from those found in dry places. The leaves of bog plants are nearly all revolute.
5. The roots of bog plants are longer than those of corresponding plants in dry positions.

The following list of bog plants which are found in this County, as well as in other parts of the province, will, perhaps, interest the beginner more than some others :—

1. **Ledum latifolium. L.** (*Labrador Tea*). Found very abundantly. The woolly leaf is particularly adapted to this kind of life.
2. **Vaccinium corombosum, L.** (*Swamp Blueberry*). This plant resembles Vacc. Penn., but is taller and berries ripen later. Common in N. S. bogs.
3. **Andromeda polifolia, L.** Is a hardy shrub quite common in our bogs.

4. **Chiogenes hipsidula, Salisb,** (*Creeping Snowberry*). Trailing over an occasional knoll adds some attraction to the dismal bog.

5 **Sarracenia purpurea, L.** (*Pitcher Plant*). Is too well known to most of us to need more than passing notice; but those who have not made a careful study of this plant should do so at the first opportunity.

6. **Vaccinium oxycoccus, L., and Vacc. macrocarpon Ait.** The small and the large cranberries are found in all our bogs. The former is commonly called the "bogberry."

7. **Rubus Chamaemorus, L.** (*Bake Apple*). This beautiful plant grows in all our bogs. Its berry rivals that of the cranberry. Its flower is only seen for a few days in the middle of June.

8. **Geum rivale, L.** (*Purple Avens*). Is commonly called the "Chocolate Flower" in many localities. It is one of our most interesting plants, and common all over the province.

9. **Impatiens fulva Nutt.** (*Touch-Me-Not*). Is a plant whose spotted sickly looking flower looks quite at home in its unhealthy surroundings; but it is found near the edge of the bog.

10. **Eriphorum vaginatum, L.** The cotton-like tufts of this plant are quite conspicuous in all our bogs.

11. **Typha latifolia, L.** (*Cat-tail Flag*). With its spike having the upper flowers staminate and the lower ones pistillate, looms up conspicuous in our bogs.

Directly on the surface of the bog will be found a dense matting consisting of vermicularia, sphagnum and cladonia; while in the central part of the raised bog where the surface is more dry may be found reindeer moss. All the other plants grow up through this matting. Here and there stand a few sickly looking spruce, birch and juniper, whose scanty, dwarfed leaves proclaim them out of their natural habitation.

This article is not intended as a list of bog plants; but I have mentioned those which best show the characteristic features of bog life. Should any student or member of this society ever make a study of plants of this kind I can assure him of an interesting study, and would like to see the result of his labours in the pages of the Bulletin.

THE MOLLUSKS OF PICTOU COUNTY.

A. R. Campbell. ('06).

After the re-organization of the Pictou Academy Scientific Association in the term of 1905-6, each of the Scientific "A" students was given some particular branch of the Pictou Co. fauna or flora for special study. To me was assigned the sub-kingdom Mollusca. On my daily walks during the remainder of the term I collected specimens along the western shore of Pictou Harbour and throughout part of the summer vacation I studied the Mollusca of Merigomish Harbour and the country round about the eastern part of it. The following list could be greatly lengthened by a more thorough study of even this limited area, and I know of numbers of Mollusca found in other parts of the county that are not found in the parts above mentioned. The classification and nomenclature is that used by Dr. Gould in his "Invertebrata of Massachusetts."

CLASS, GASTEROPODA.—SUB-CLASS PULMONIFERA.

1. **Helix albolabris.**—Large land snail ; not very common.

2. **Helix striatella.**—Common under decayed logs.

3. **Succinea obliqua**—Common. May often be found dead on the ties where the railway passes through swamps, having been killed by the sun's heat.

4. **Physa heterostropha.**—Found dead specimens in W. T. Irving's mill-dam, French River.

5. **Hyalina arborea.**—Very common under stones and decayed logs in the woods.

6. **Hyalina chersina.**—Not common. Found in deep woods,

7. **Hyalina indentata.**—Common. Found in company with H. arborea.

8. **Hyalina milium.**—Not common. Found under decayed wood and stones.

9. **Limax agrestus.**—Common "slug." Found in damp places about all buildings.

10. **Limax campestris.**—Common.

11. **Tebennophorus dorsalis.**—Dies in about 15 minutes when exposed to the dry air. Found under stones in the woods and in cellars.

SUB-CLASS—PROSOBRANCHIATA.

12. **Crepidula fornicata**—Common in Northumberland Strait.

13. **Crepidula plana.**—May be found abundantly in old shells of L. heros taken up in lobster traps.

14. **Littorina littorea.**—Very common on all coasts.

15. **Littorina paliata.**—Common in the harbours.

16. **Littorina tenebrosa.**—Common on wharves and in marshes,

17. **Littorina rudis** —Not very common. In harbours.

18. **Nassa obsoleta;**—Very common.

19. **Lunatia heros.**—Common "Sand collar Snail."

20. **Lunatia triseriata.**—Common. Is considered to be the young of L. heros. I have one shell 15-16 of an inch in length.

21. **Lunatia groenlandica.**—Not common.

22. **Tectura alveus.**—Common on eel-grass in harbours.

23. **Purpura lapillus.**—Found on the rocky shore at the back of Big Island.

24. **Lacuna vincta.**—Rare.

25. **Bella cancellata.**--Not very common.

26. **Bittium nigrum.**—Abundant on Fucus and other seaweed in harbours.

27. **Odostomia seminuda.**—Found clinging to other shells and rocks.

28. **Rissoa latior.**—Found on harbour flats and sheltered rocks.

29. **Skena planorbis.**—Found clinging to seaweed at mouth of Pictou Harbour.

CLASS, CONCHIFERA.

30. **Solen ensis** —Found on the flats in harbours.

31. **Venus mercenaria.**—Found in considerable numbers near low water mark in harbors.

32. **Mya arenaria.**--Common clam. Very abundant.

33. **Mytilus edulis.**—Also very abundant. In Merigomish Harbour is a place called the Mussel bed where the mud is so full of the Mussel shells that it is dredged out in the winter and used for fertilizing.

34. **Modiola plicatula.**—Common in marshes and on rocks.

35. **Modiola modiolus.**—"Great Horse Mussel." Common.

36. **Ostrea virginica.**—Oyster. Common.

37. **Mactra ovalis.**—Common on shore of Northumberland Strait.

38. **Mactra solidissima.**—Found on shore of Nortumberland Strait. Not very common.

39. **Pecten tenuicostatus.**—Scallop. Found on Gulf Shore. Not common.

40. **Macoma fusca.**—Common in our harbours.

THE BULLETIN

OF THE

Pictou Academy
...Scientific Association...

....CONTENTS....

The P. A. Scientific Association.
The Land Birds of Pictou County.
Myxomycetes of Pictou County.

THE BULLETIN

OF THE

Pictou Academy
...Scientific Association...

....CONTENTS....

The P. A. Scientific Association.
The Land Birds of Pictou County.
Myxomycetes of Pictou County.

PRESS OF THE PICTOU ADVOCATE.

THE BULLETIN.

Vol. I. Pictou Academy, June 1906. No. 1.

THE Pictou Academy Scientific Association was instituted in 1882 and during the earlier years of its existence much valuable work was done by the various clubs of which it was composed, in making collections of the local fauna and flora and in stimulating interest among the students of the institution in Scientific work. These collections have been largely preserved in the Museum of the Academy and have been added to from time to time since. In later years, however, the laboratory classes to a great extent usurped the place of the old working clubs and the Scientific Association ceased to be a factor in the life of the Academy as a working organization. During the past session it was re-organized and in order that a record might be had of any work done by its members which might be of more general and permanent interest it was decided to publish bulletins from time to time, in which the results of such work might be preserved. The present number is the first of such publications.

Membership in the Association is open to all Academy students and alumni and to others, as associate members, who are interested in the work of the institution. A nominal fee of fifty cents per annum is exacted of members who wish to receive copies of the Bulletin as issued.

The officers for the current year are:

Hon. President—R. McLellan.

President—C. L. Moore.

Vice-President—A. G. Baillie.

Sec'y-Treas.—H. F. Munro.

Executive—The Officers, J. W. Mortimer, R. L. Titus and Jos. Haley.

All correspondence should be addressed to H. F. Munro, Pictou Academy, Pictou, N. S.

LAND BIRDS OF PICTOU COUNTY.

Edited by HENRY F. MUNRO, B. A.

DURING the years 1904-5 a series of systematic observations upon the land birds of Pictou County was conducted by Messrs Boehner, Fraser and Munro, of the Academy Staff. Most of them apply to a small district, about a square mile in extent, situated to the north of Pictou Town and presenting a variety of natural feature attractive to birds. During the spring months a portion of each day, varying from two to four hours, was spent in this territory, while on Saturdays, usually, some other district in the vicinity was visited. In this way, by the end of June, 1905, most of the County within easy access of the town had been covered. Field glasses were used, the gun being resorted to only in rare cases of doubt. As most of the observations were made by all three observers at the same time, they were thus carefully checked. Throughout, the results were compared with the "Catalogue of Canadian Birds" issued by the Geological Survey, with Downs' "Birds of Nova Scotia," and with the notes published from time to time by Mr. Harry Piers in the "Transactions of the Nova Scotia Institute of Science." In determinations, the guides were Audubon's Works, Chapman's "Handbook" and, as final, Coues' "Key of North American Birds."

In the following list, the numbers refer to the notation of the A. O. U's "Check List," the dates, to the arrival of the first migrants observed in Spring, 1905.

298c. **Canachites canadensis.**—*Spruce Partridge.*—Rare. A nest was found on May 28th, about half a mile from the town of Pictou. The nest was placed on the ground under a small spruce tree and contained only seven eggs, although the female was incubating. It was a merely a depression in the moss, lined with a few of the bird's feathers. A covey of four or five was seen later in the same locality.

300a. **Bonasa umbellus togata.**—*Birch Partridge.*—Common.

331. **Circus hudsonius.**—*Marsh Hawk.*—Not rare.

334. **Accipiter atricapillus.**—*American Goshawk.*—Not rare.

352. **Haliaeetus leucocephalus.**—*Bald Eagle.*—Rare. One taken at West River, 1904.

357. **Falco columbarius.**—*Pigeon Hawk.*—Not rare. Apr. 16.

364. **Pandion haliætus carolinensis.**—*Fish Hawk.*—Not common.

368. **Syrnium varium.**—*Barred Owl.*—Not uncommon.

388. **Coccyzus erythrothalmus.**—*Black-billed Cuckoo.*—Rare. One pair fre-

quented the orchards in the town of Pictou during the summer of 1905.

390. **Ceryle alcyon.**—*Belted Kingfisher.*—Common. April 21.

393a. **Dryobates villosus leucomelas.**—*Northern Hairy Woodpecker.*—Rather common resident.

394c. **Dryobates pubescens medianus.**—*Downy Woodpecker.*—Rather common resident.

400. **Picoides arcticus.**—*Arctic Three-toed Woodpecker.*—Rather rare.

402. **Sphyrapicus varius.**—*Yellow-bellied Sapsucker.*—Rather common summer resident. Apr. 29.

405a. **Ceophloeus pileatus abieticola.**—*Northern Pileated Woodpecker.*—Rare.

412a. **Colaptes auratus luteus.**—*Northern Flicker.*—Common. Apr. 19.

420. **Chordeiles virginianus.**—*Night Hawk.*—Common. May 28.

423. **Chaetura pelagica.**—*Chimney Swift.*—Common.

428. **Trochilus colubris.**—*Ruby-throated Hummingbird.*—Common. May 23.

444. **Tyrannus tyrannus.**—*Kingbird.*—Common. May 23.

459. **Nuttallornis borealis.**—*Olive-sided Flycatcher.*—Not rare. May 27.

461. **Contopus virens.**—*Wood Pewee.*—Not rare.

463. **Epidonax flaviventris.**—*Yellow-bellied Flycatcher.*—Rather common. May 29.

466a. **Epidonax traillii alnorum.**—*Alder Flycatcher.*—Rather common. June 4.

467. **Epidonax minimus.**—*Least Flycatcher.*—Common. May 17.

477. **Cyanocitta cristata.**—*Blue Jay.*—Common resident.

484. **Perisoreus canadensis.**—*Canada Jay.*—Rather uncommon resident.

486a. **Corvus corax principalis.**—*Northern Raven.*—Not common. A specimen taken at Carriboo, July, 1905.

488. **Corvus americanus.**—*American Crow.*—Common.

494. **Dolychonyx oryzivorous.**—*Bobolink.*—Common. May 20. Migrates in flock which are in full song on arrival.

495. **Molothrus ater.**—*Cowbird.*—One male seen near New Glasgow Apr. 16. Probably a straggler.

498. **Agelaius phoeniceus.**—*Red-winged Blackbird.*—Breeding in swamps at Trenton and Carriboo. Not common.

509. **Scolecophagus carolinus.**—*Rusty Blackbird.*—Common.

511b. **Quiscalus quiscula aeneus.**—*Bronzed Grackle.*—Very common about Pictou, New Glasgow and Carriboo. A large flock nests in a grove of spruce in Pictou town. March 31.

515. **Pinicola enucleator leucra.**—*Pine Grosbeak.*—Common during winter of 1903-4; not seen the following winter.

517. **Carpodacus purpureus.**—*Purple Finch.*—Common. Apr. 7. A few remain all winter.

—— **Passer domesticus.**—Abundant.

521. **Loxia curvirostra minor.**—*American Crossbill.*—Irregular. Seen often.

522. **Loxia leucoptera.**—*White-winged Crossbill.*—Irregular. Seen often.

528. **Acanthis linaria.**—*Redpoll* —Common during early spring.

529. **Astragalinus tristis.**—*American Goldfinch.*—Common. May 20.

533. **Spinus pinus.**—*Pine Siskin.*—Common.

534. **Passerina nivalis.**—*Snowflake.*—Rather common during winter.

540. **Pooecetes gramineus.**—*Vesper Sparrow.*—Common. Apr. 22.

542a **Passerculus sandwichensis savanna.**—*Savanna Sparrow.*—Common. April 22nd.

549a. **Ammodramus nelsoni subvirgatus.**—*Acadian Sharp-tailed Sparrow.* Common on salt marshes at Chance Harbour, Merigomish, and seen on marshes at New Glasgow.

558. **Zonotrichia albicollis.**—*White-throated Sparrow.*—Abundant. Apr. 29.

559. **Spizella monticola.**—*Tree Sparrow.*—A small flock seen Dec. 1905.

560. **Spizella socialis.**—*Chipping Sparrow.*—Very common. May 3.

567. **Junco hyemalis.**—*Slate-colored Junco.*—Abundant summer resident. A few remain all winter. March 25.

581. **Melospiza cinerea melodia.**—*Song Sparrow.*—Abundant. Mar. 25.

584. **Melospiza georgiana.**—*Swamp Sparrow.*—Common in swamps. Apr. 23.

585. **Passerella iliaca.**—*Fox Sparrow.*—Abundant migrant during Spring and Fall. March 31-May 3. Passes south during October.

595. **Zamelodia ludoviciana.**—*Rose-breasted Grosbeak.*—Not common. Found at Maclellan's Brook, Sunny Brae and New Glasgow.

612. **Petrochelidon lunifrons.**—*Cliff Swallow.*— Common.

613. **Hirundo erythrogastra.**—*Barn Swallow.*—Common.

614. **Iridoprocne bicolor.**—*Tree Swallow.*—Common Apr. 24.

616. **Riparia riparia.**—*Bank Swallow* —Common, especially along the coast.

619. **Ampelis cedrorum.**—*Cedar Waxwing.*—Not rare.

624. **Vireo olivaceus.**—*Red-eyed Vireo.* Common. May 28.

629. **Vireo solitarius.**—*Blue-headed Vireo.*—Not rare in Spring. May 22.

636. **Mniotilta varia.**—*Black and White Warbler.* Common. May 13.

645. **Helminthophila rubricapilla.**—*Nashville Warbler.*—Common in Spring. Not rare during Summer. May 11.

648a. **Compsothlypis americana usneae.**—*Northern Parula Warbler.*—Common in Spring. Not rare during Summer. May 22.

650. **Dendroica tigrina.**—*Cape May Warbler.*—Rare. May 11. Several were seen near Pictou during the spring migration. May 11-23. A male was seen at Sunny Brae, June 10, and at Merigomish, July 15.

552. **Dendroica æstiva.**—*Yellow Warbler.*—Common. May 15.

654. **Dendroica caerulescens.**—*Black-throated Blue Warbler.*—Rare. Only one pair seen near New Glasgow.

655. **Dendroica coronata.**—*Myrtle Warbler.*—Common. Apr. 25.

657. **Dendroica maculosa.**—*Mangolia Warbler.*—Common. May 21.

659. **Dendroica pensylvanica**.—*Chestnut-sided Warbler.*—Rare. Seen at Meadowville and Scotsburn. May 24.

661. **Dendroica striata.**—*Black-poll Warbler.*—Rare. A few were seen during the spring migration. Not observed during the summer.

662. **Dendroica blackburniae.**—*Blackburnian Warbler.*—Not uncommon summer resident. May 24.

667. **Dendroica virens.**—*Black-throated Green Warbler.*—Common. May 11.

672a. **Dendroica palmarum hypochrysea.**—*Yellow Palm Warbler.*—Very common during spring migration; not rare summer resident. Apr. 21.

674. **Seirus aurocapillus.**—*Oven-bird.* —Common. May 23.

675. **Seiurus noveboracensis.**—*Water Thrush.*—Uncommon. May 27.

679. **Geothlypis philadelphia.**—*Mourning Warbler.*—Rare. Only one pair seen near New Glasgow.

681. **Geothlypis trichas brachidactyla.**—*Northern Yellow-throat.*— Common. May 20.

685. **Wilsonia pusilla.**—*Wilson's Warbler.* —Rare. May 20.

686. **Wilsonia canadensis.**—*Canadian Warbler.*—Rather common. May 27.

687. **Setophaga ruticilla.**—*American Redstart.*—Common. May 25.

704. **Galeoscoptes carolinensis.**—*Catbird.*—Rare. Seen at New Glasgow.

722. **Olbiorchilus hiemalis.**—*Winter Wren.*—Not rare. Found at Pictou, Meadowville, Scotsburn, New Glasgow and Maclellan's Brook.

726. **Certhia familiaris americana.**—*Brown Creeper.*—Rather common resident.

727. **Sitta carolinensis.**—*White-breasted Nuthatch.*—Rare.

728. **Sitta canadensis.**—*Red-breasted Nuthatch.*—Uncommon.

735. **Parus atricapillus.**—*Chickadee.*—Common.

740. **Parus hudsonius littoralis**.—*Canadian Chickadee.*—Common resident.

748. **Regulus satrapa.**—*Golden-crowned Kinglet.*—Common winter resident.

749. **Regulus calendula.**—*Ruby-crowned Kinglet.*—Not uncommon during spring migration; rare in summer. Apr. 23.

758a. **Hylocicla ustulata swainsonii.**—*Olive-backed Thrush.*—Not uncommon. May 22.

759b. **Hylocichla guttata pallasii.**—*Hermit Thrush.*—Common. May 3.

761. **Merula migratoria.**—*Robin.*—Abundant. March 27.

* * * *

The following labelled "taken at Pictou" are in the museum of Pictou Academy.

360. **Falco spaverius.**—*American Sparrow Hawk.*

366. **Asio wilsonianus.**—*American Long-eared Owl.*

372. **Nyctala acadica.**—*Saw-whet Owl.*

375. **Bubo virginianus.**—*Great Horned Owl.*

376. **Nyctea nyctea.**—*Snowy Owl.*

377a. **Surina ulula caparoch.**—*American Hawk Owl.*

416. **Antrostomus carolinensis.**—*Chuck-will's-widow.*— Taken near Pictou Academy, Aug. 1890. This has been fully discussed by Mr. Piers in his notes on Nova Scotia Zoology, published in Transactions of N. S. Institute of Science, Vol. 8, pp. 405-6.

507. **Icterus galbula.**—*Baltimore Oriole.*—("taken in Nova Scotia.)

598. **Cyanospiza cyanea.**—*Indigo Bunting.*

671. **Dendroica vigorsii.**—*Pine Warbler.*

To this list may be added the following birds that, strictly speaking, do not come under the title:

190. **Botaurus lentiginosus.**—*American Bittern.*—Common. Apr.

174. **Ardea herodias.**—*Great Blue Heron.*—Common. Apr.

228. **Philohela minor.**—*American Woodcock.*—Not common. Apr.

230. **Gallinago delicata.**—*Wilson's Snipe.*—Common. Apr.

* * * *

The following additional observations were made in 1906:

332. **Accipiter velox.**—*Sharp-shinned Hawk.*—One shot Apr. 25.

474. **Otocoris alpestris.**—*Horned Lark.*—One seen Mar. 21.

621. **Lanius borealis.**—*Northern Shrike.*—One seen Apr. 8.

660. **Dendroica castanea.**—*Bay-breasted Warbler.*—One seen May 21; another June 5.

The following comments may be made upon the list:

Spruce Partridge.—Mr. Downs did not know of any one, even an Indian, who had found its nest, and, so far as could be learned, there is no record of its having been found in N. S. since.

Bronzed Grackle.—Rare with Downs. Very common about Pictou.

Savana Sparrow.—Uncommon with Downs. One of the common birds about Pictou.

Acadian Sharp-tailed Sparrow.—"I think this bird occurs in the province"—Downs. Found to be common on salt marshes along coast of Northumberland Strait. Dwight, who discovered this species in 1887, did not know of its occurrence in Nova Scotia. The survey reports it from Cape Breton and P. E. Island. Presumably this is the first time it has been reported on the northern shore of the peninsula.

Tree Sparrow—"Common winter visitor."—Downs. Rare at Pictou.

Blue-headed Vineo.—"Probably occurs"—Downs. Not rare in spring at Pictou.

Nashville Warbler.—"Not very common"—Downs. Common in spring, not rare in summer at Pictou.

Northern Parula Warbler.—Rare and always in tops of high trees, according to Downs. Found to be common in spring at Pictou. Sometimes observed on low growths such as alders.

Cape May Warbler.—Downs obtained only one specimen of this bird—at Stewiacke. Several were seen by the Pictou observers during 1905, and in different parts of the County.

Chestnut-sided Warbler.—"Abundant summer resident"—Downs. Rare in Pictou County.

Blackburnian Warbler.—Very rare with Downs. Not uncommon summer resident, according to this report. It is probably overlooked by most observers on account of its lofty perch.

Yellow Palm Warbler.—"Not very common"—Downs. Very common in spring at Pictou.

Water Thrush.—"Rather common summer resident"—Downs. Uncommon in Pictou County.

Canadian Warbler.—Not reported by Downs. Rather common at Pictou.

Cat-bird.—Rather common with Downs. Rare in Pictou County.

White-breasted Nuthatch.—"Rather common summer resident"— Downs. Rare at Pictou.

* * * *

Of the birds reported by Downs. within the limits of this list, nineteen, exclusive of hawks and owls, were not observed in Pictou County. Of these, four or five may reasonably be expected to occur. The rest are accidental visitants or mere stragglers. Only one—the Canadian Warbler--is new to Downs' list, outside of the last four mentioned as being in the Academy Museum, none of which are reported by him.

The Myxomycetes of Pictou County.

C. L. MOORE, B. A.

INTRODUCTORY.

IT is in the deep shade of undisturbed woodland where the air is warm and moist during the heat of summer that the Maxomycetes are to be found in great profusion. In such a situation examine a number of mouldering windfalls and decaying stumps and almost of a certainty you will find, in addition to the mosses and liverworts which flourish in such situations, a number of other growths differing much in appearance from any of these mentioned. Perhaps they take the form of little stalked plume-like bodies, brown or purplish brown in color, scarcely half an inch in height, growing closely together in small patches of a square an inch in height, growing closely together in small patches of a square inch or thereabouts in area. This is the fructification of a Myxomycete, probably one of the Stemonitas. A breath sends flying from them a little cloud of dust, the spores of the organism. Again you may discover portions of the surface of one of these old windfalls thickly dotted with little stalked globes the whole barely one tenth of an inch in height, white, brown or yellowish in color. These too are fructifications of species of the same class of organisms. These may be the sporangia of species of Physarum or Cribraria. Yet again you may find a thick cake like mass resting upon the moss or wood, perhaps two or three inches in diameter and from one half an inch to an inch thick. This is covered with a firm calcareous outer crust and when this is broken the interior apparently consists of a mass of fine dark purplish brown powder. Here no doubt you have the fructification of a Fuligo. Or you may find a cluster of what appears to be a species of puff ball ; but if you are fortunate enough to discover these in process of development, you will know that they are formed from little rosy masses of semi-fluid material which exude from the interior of the wood and gradually assume the mature form which so strongly resembles the common puff ball. There is no trace, however, of a mycelium so characteristic of the true fungi. The species you have examined here is Lycogala epidendrum Fr. one of our commonest Myxomycetes.

Perhaps also in the course of your investigations you will find portions of the surface of the old windfall covered with a thin layer of semi-fluid material of the consistency of white of egg, watery white or possible yellowish or reddish in color, its limits well defined; or strands of similar material may form a network over areas of the surface several square inches in extent. You have here, no doubt, the plasmodial or vegetative phase of a Myxomycete before it has become transformed into the numerous sporangia of the reproductive phase. On the moss, too, in such a situation as we are considering you may find spread out over the stems and leaves a lumpy mass of this plasmodial substance, bright yellow in color, and a second visit to the spot the next day would reveal a transformation into a heap of sporangia crowded with spores.

The members of the group of organisms under consideration are as a rule inconspicuous objects both in their vegetative phase and in fructifications and this combined with the fact that the study and classification of them involves the use of good lenses of high power, perhaps accounts for the fact that our Nova Scotian forms have been practically ignored by students of our fauna and flora. The only reference which I find to them in local literature is in a paper by the late Dr. Somers, on Nova Scotian fungi, published in the transactions of the Nova Scotia Institute of Science where two of our common forms are listed, viz : Lycogala epidendrum Fr. and Aethalium Septicum. Fr. (Fuligo ovata, Schaeff, Macbr.) These two species are also enumerated by Dr. A. H. McKay, in his provisional list of the Nova Scotian Fungi, published in the Transactions of the same Society.

The Myxomycetes may be defined as a group of organisms, destitute of chlorophyll, presenting in the course of their life history, two very distinct phases ; the vegetable or growng assimilative phase and the reproductive. The vegetable phase is very simple, consisting of a mass of proloplasm destitute of cell walls, and exhibiting amoeboid movements. This phase is described as plasmodial. In the reproductive phase the greater part of this protoplasmic material is transformed into spores, which are produced either free or in closed capsules or sporangia. The spores on germination give rise to amoeboid bodies or "swarmers" and these unite to form plasmodia. An outline of the life history of a typical Myxomycete would be as follows : The spores under suitable conditions of moisture and temperature germinate ; the wall cracks open and the contents escape in the form of a minute, naked amoeba like body which creeps about on the substratum, ingests food and in every essential particular resembles a small amoeba. After a short time a cilium is developed by which more active movement through the water is rendered possible. The young "swarmers" as they are now termed, continue this manner of existence for some days their number being greatly increased by the repeated binary division of the individuals. Eventually they settle down, the cilium is withdrawn and the amoeboid form resumed. They now soon begin to aggregate in groups, a large number coalescing to form a protoplasmic mass which continues to exhibit the characteristic creeping, amoeboid movements and in addition exhibits complex protoplasmic streamings in the interior of its substance.

This is spoken of as the plasmodial phase and the organism is known as the plasmodium of the species. The plasmodia are for the myxomycetes the distinguishing structure and the characteristic life form. . The plasmodium is often of considerable size extending over the sub-stratum in the form of a thin protoplasmic film or a net of vein like strands, for a distance of one or two feet. In most cases, however, the habitat of the plasmodium is in the interior of decaying wood where it spreads through the interstices arising from the lines of growth, or in decaying vegetable materials of various kinds from which it emerges only for fructification. Each of the original swarmers which give use to the plasmodium has a well defined nucleus and no nuclear fusion appears to take place in connection with the formation of the plasmodium. In this latter the original nuclei persist and as the plasmodium increases in size by the ingestion and assimilation of food material a corresponding increase in the number of nuclei takes place by Karyokinetic division.

After a period of indefinite length the plasmodium passes into the fruiting or reproductive phase. This always occurs on the surface of the supporting substance. The whole plasmodium becomes heaped up into a number of protuberances into which the whole of its protoplasm passes with the exception of a small portion which may remain behind to form a film-like coating over the substratum, and which is known as the hypothallus. When these protuberances are distinct from each other they are known as sporangia and these may be either sessile or stipitate. The stipe may be prolonged into or through the cavity of the sporangium to form a columella. When the sporangia are vein-like or sinuous, retaining largely the characteristic form of the plasmodium, the fructification is described as plasmodiocarpous, or as a plasmodiocarp.

In other cases the sporangia are partially fused together, the walls between them may be imperfectly developed and their individuality to a certain extent lost. Such a form of fructification is spoken of as an aethalium and is well exemplified by such a species as Fuligo ovata.

The transition from the creeping, naked, plasmodial phase to that of mature sporangia occupies a comparatively short time. I have observed the active streaming plasmodium of one of our species, Physarum globuliferum become transformed within the space of twenty-four hours into a multitude of mature, stalked sporangia.

The protoplasm of the interior of the sporangia for the most part is converted into spores but a portion not utilized for this purpose frequently gives rise to a capillitium. This may consist of a network of threads or tubules extending throughout the cavity of the sporangium with points of attachment to the walls or to the columella when present or to both and frequently with thickenings at the nodes of the net. Or it may consist of simple or branched free threads or elaters often with spiral marking, and recalling the elaters of same of the hepatics. The function of the capillitum is to assist in the dispersal of the spores. The spores themselves are usually small and for the most part spherical. They vary in size in the different species from .003 to .02 m m. a great many falling between the limits of .007—.012 m m. The spores are provided with a cellulose wall which generally exhibits thickennings in the form of spines, warts or reticulating bands. The nature of the fructification, the structure of the capillitium, the size and markings of the spores and the presence or absence of lime either in the capillitial tubules or in connection with the walls of the sporangia are features of taxonomic importance.

In one group of the Myxomycetes spores are formed free viz : The Exosporeae. Here the spores are developed superficially outside the fructification which consists of sporophores either membranous or slender and branching. The spores in this group are stalked. This sub-class contains but a single genus Cerati myxa.

Another group differing somewhat from the type above described is the subclass Phytomyxinae, the parasitic Myxomycetes. They exist in the living cells of plants. Their vegetative phase is plasmodial and their spores are formed by the simultaneous breaking up of the plasmodium, and lie free in the cells of the host plant. The only member of this sub-class which I have found occurring here is Plasmodiophora brassicae, Woronin, which lives in the parenchymatous cells of the roots of cabbage and produces the disease of that vegetable known as "Club root." The roots of an infected plant becomes much distorted by irregular growth and covered with nodules and thickenings. Later decay sets in.

The Myxomycetes on the basis of the above characteristics may be divided into three subclasses.

Sub class I. Phytomyxinae—parasite in the cells of the living plants.
Sub class II. Exosporeae, forms with free spores.
Sub class III. Myxogastres—the Myxomycetes proper with spores, produced in receptacles or sporangia.

This classification does not take into consideration the Acrasieae, a closely related group of organisms generally included in the class.

Below is given a list of the forms which I have found occurring in Pictou County. It is the result of collections made during a portion of one season and over a very limited area, and undoubtedly can be greatly extended by further observations. The classification and nomenclature is that of Dr. T. H. Macbride, as given in his "North American Slime Moulds."

Myxomycetes (Link) DeBary.

Sub-class, PHYTOMYXINAE, *Schroeter.*
Genus. PLASMODIOPHORA. *Woronin.*

1. **Plasmodiophora brassicae.** *Woronin.* Infesting roots of cabbage. Saltsprings.

Sub class. EXOSPOREAE.
Genus. CERATIOMYXA. Schroeter.

2. **Ceratiomyxa fructiculosa (Muell.)** *Macbr.* In coniferous woods forming mould like patches on shaded decaying pine logs. Pictou.
3. **Ceratiomyxa porioides (Ab. & Schw.)** *Schroeter.* On decaying hemlock blocks. Plasmodium watery white.

Sub-class. MYXOGASTIES (Fries) Macbr.
Order. PHYSAREAE.
Fam. PHYSAREAE.
Genus. FULIGO (Haller.) Pers.

4. **Fuligo Ovata (Shaeff.)** *Macbr.* Common everywhere.
Genus. PHYSARUM (Persoon) Rost.

5. **Physarum virescens, Ditmar.** On moss. Plasmodium yellow.

6. **Physarum globuliferum (Bull.)** *Pers.* Plasmodium watery white forming reticulations of vein like strands. On decaying Abies balsamea.

7. **Physarum galbeum.** *Wingate.* On Abies balsamea. Pictou.

8. **Tilmadiche Alba (Bull).** *Macbr.* On decaying conifer. Pictou.

9. **Tilmadoche viridis (Bull)** *Saccardo.* On decaying Fagus ferruginea. Saltsprings.
Genus. LEOCARPUS (Link) *Rost.*

10. **Leocarpus fragilis (Dickson)** *Rost.* On decaying Abies balsamea. Pictou.
Genus. DIDYMIUM (*Schrad.*) Fr.

11. **Didymium melanospermum (Pers.)** *Macbr.* On decaying Fagus ferruginea, moss, stumps of birch etc. Common. Pictou.
Order. STEMONITACEAE.
Fam. STEMONITEAE.
Genus. STEMONITIS (Gleditsch) *Rost.*

12. **Stemonitis fusca (Roth).** *Rost.* On decaying Pinus strobus. Pictou.

13. **Stemonitis maxima.** *Schweinitz.* On decaying Fagus ferruginea. Saltsprings.

14. **Stemonitis smithii.** *Macbr.* Coniferous woods.
Genus. COMATRICHA (Preuss.) Rost.

15. **Comatricha stemonitis (Scop.)** *Sheldon.* Decaying conifer. Saltsprings.
Genus. LAMPRODERMA.

16. **Lamproderma arcyrionema.** *Rost.* Pictou. On Abies balsamea.
Genus. LINBLADIA. Fries.

17. **Linbladia effusa (Ehr.)** *Rost.* On leaf mould in coniferous woods.
Order. CRIBRARIACEAE.
Fam. TUBIFEREAE.
Genus. TUBIFERA.

18. **Tubifera ferruginea (Batsch).** *Macbr.* On decaying hemlock. Pictou.
Fam. CRIBRARIACEAE.
Genus. CRIBRARIA (Pers.) *Schrader.*

19. **Cribraria macrocarpa.** *Schrader.* On decaying hemlock. Saltsprings.

20. **Cribraria dictydioides Cke. & Balf.** On decaying conifer. Pictou.
Genus. DICTYDIUM (Schrad.) *Rost.*

21. **Dictydium cancellatum** (**Batsch**) *Macbr.* Common. Pictou.
Order. LYCOGALACEAE.
Genus. LYCOGALA. Micheli.

22. **Lycogala epidendrum** (**Buxb.**) *Fries.* Common everywhere.
Order. TRICHIACEAE.
Fam. ARCYRIEAE.
Genus. ARCYRIA (Hill) Pers.

23. **Arcyria nutans** (**Bull.**) *Grev.* Common.

24. **Arcyria incarnata.** *Persoon.* On Populus tremuloides and Fagus ferruginea. Pictou and Saltsprings.

25. **Arcyria ferruginea Sauter.** Pictou.

26. **Arcyria denudata** (**Linn**). *Sheldon.* On decaying conifers. Pictou.

27. **Arcyria cinerea** (**Bull**) *Pers.* Common. Pictou and Saltsprings.
Fam. TRICHIEAE.
Genus. HEMITRICHIA. Rost.

28. **Hemitrichia vesparium** (**Batsch**) *Macbr.* On decaying Populus tremuloides. Pictou.

29. **Hemitrichia stipata** (**Schw.**) *Macbr.* On decaying Populus grandidentata. Pictou.

30. **Hemitrichia stipitata, mass.** On decaying Populous grandidentata and Fagus ferruginea. Pictou and Saltsprings.
Genus. TRICHIA.

31. **Trichia varia** (**Pers.**) *Rost.* On under side decaying Populus grandidentata. Pictou.

32. **Trichia decipiens** (**Pers.**) *Macbr.* Associated with No. 31 above.

33. **Trichia fallax.** *Pers.* On decaying conifer. Pictou.

* * * *

The fruiting season for the Myxomycetes extends with us from the first of June until the latter part of October. I have, indeed, discovered Hemitrichia stipata and Trichia varia producing fructifications as late in the season as November 26th after a period of unusually warm weather. The first to appear is Lycogala epidendrum which is commonly found fruiting about the first of June. For the study of the "swarmers" my experience is that of the forms enumerated above Fuligo ovata is one of the best for the purpose. I have found the spores of this species to germinate readily in tap water in about four or five hours and these from material which had been in collection six or seven months.

THE BULLETIN

OF THE

Pictou Academy
....Scientific Association....

CONTENTS.

Contributions to a Flora of Nova Scotia.

Bog Plants.

THE BULLETIN

OF THE

Pictou Academy ...Scientific Association...

CONTENTS.

Contributions to a Flora of Nova Scotia.

Bog Plants.

THE BULLETIN

VOL. I. PICTOU ACADEMY, APRIL 1907 NO. 3.

THE Pictou Academy Scientific Association was instituted in 1882 and during the earlier years of its existence much valuable work was done by the various clubs of which it was composed, in making collections of the local fauna and flora and in stimulating interest among the students of the institution in Scientific work. These collections have been largely preserved in the Museum of the Academy and have been added to from time to time since. In later years, however, the laboratory classes to a great extent usurped the place of the old working clubs and the Scientific Association ceased to be a factor in the life of the Academy as a working organization. During the session of 1905-6 it was re-organized and in order that a record might be had of any work done by its members which might be of more general and permanent interest it was decided to publish bulletins from time to time, in which the results of such work might be preserved. The present number is the third of such publications.

Membership to the Association is open to all Academy students and alumni and to others, as associate members, who are interested in the work of the institution. A nominal fee of fifty cents per annum is exacted of members who wish to receive copies of the Bulletin as issued.

The officers for the current year are :

Hon. President :—R. MacLellan.

President :—C. L. Moore.

Vice-President :—H. H. Mussells.

Sec'y.-Treas.—H. F. Munro.

Executive :—The Officers, Miss H. Baird, W. H. Porter and E. T. Parker.

All correspondence should be addressed to H. F. Munro, Pictou Academy, Pictou, N. S.

Contributions to a Flora of Nova Scotia. I.

PLANTS COLLECTED IN EASTERN NOVA SCOTIA IN AUGUST, 1906.

CHARLES BUDD ROBINSON.

AT THE suggestion of Dr. N. L. Britton, Director-in-Chief of the New York Botanical Garden, my vacation trip during the above month was extended, to enable me to add to the collections of Nova Scotian plants then in the herbarium of that institution. From the species gathered it was therefore my general aim to exclude those already represented there by my own previous collections, and also those of very wide distribution. As a result, the species here enumerated are so far from being the only ones obtainable in Eastern Nova Scotia at that season, that few of the commonest are included. Yet as about a dozen are listed which are believed to be additions to the known flora of the province, and many others were secured in the hope of shedding light on obscure or disputed points, it has seemed advisable to publish the determinations, with a few notes added on points of interest. A full set of the plants is in the herbarium of the New York Botanical Garden, and the comparatively few duplicates were sent to Pictou and Truro Academies. Attention was nearly restricted to flowering plants, but a few belonging to lower groups were collected as occasion served.

Some ten days were spent on the west of the Island of Cape Breton from Mabou to Cheticamp. The collections made in the former district between the 7th and 10th were the most extensive, comprising Nos. 223-310 and 321-329, and a side trip on the 9th to Inverness added Nos. 311-320, obtained in a marsh near the shore.

On the morning of the 11th I walked up the valley of the N. E. Margaree from the Forks to Frizzleton, and thence with a guide went back over the hills to two large barrens known as McDonald's and Peter's, situated near the boundary of Inverness and Victoria Counties, at an elevation of about 1200 feet above sea level, being compelled in order to visit the latter to spend the night in the woods. It was impossible to explore it owing to heavy fog, and the rare fern *Schizaea pusilla* discovered there a year previously by Mr. G. E. Nichols was not seen, but other interesting finds were made. The Margaree collections are Nos. 330-383.

On the afternoon of the 13th, the road from the Big Intervale, at the head of settlement on the N. E. Margaree, was followed over the hills to Grand Etang, a well-rewarded stop being made at the lower end of Pembroke Lake, a beautiful sheet of water at an elevation of about 1200 feet, with rocky but low shores. Next morning, collections were made on an exposed bluff below Grand Etang, and at a large pond near Friar's Head. A severe storm then set in lasting several days, and although I went on to Eastern Harbour, this and the absence of means of transportation to the north prevented further progress, only a very few additions being made there and on the return journey along the coast. The Cape Breton numbers run in all from 223 to 417.

Although separated by such short distances, each valley showed a very considerable proportion of different species from its neighbours. One new station was found for the male fern, on a rocky hillside at the Big Intervale of Margaree, but as usual only a couple of plants were seen, and they were in such wretched condition that they were not worth preserving. No effort was made to visit waterfalls or rocky glens either here or on the mainland, and therefore few mosses and no true ferns were gathered, but the rarer species of the latter were already represented by earlier collections.

Before and after this my headquarters were at Pictou. The only trip outside the limits of the county was a flying one on the 23rd, to Lochaber in Antigonish, and it proved unproductive. Within Pictou County several places were visited, though most of the species were gathered near the town. On East River the road was followed on the 25th from Springville to Grant's Lake at Millstream, and thence through Island and Eureka to Ferrona Junction; on the previous day a visit was made to the banks of West River below Durham, and on the 21st the ballast-heaps at Pictou Landing were explored. In spite of several less important journeys, the total area covered was very small, but carefully selected in the light of previous experience. The Pictou County numbers are 206-222, 418-465, and 476-531, those from Antigonish 466-475.

In all cases the determinations have been checked with the collections in the herbarium of the New York Botanical Garden, and in critical cases opinions have been sought from various specialists. Besides those named in the text, acknowledgements for valuable assistance are due to Dr. Britton, Dr. Rydberg, Mr. W.W. Eggleston, Mr. K. K. Mackenzie, Mr. W. H. Blanchard, and Mr. Percy Wilson.

The collections were as follows:—

ALGAE.

FUCACEAE.

Fucus serratus L. was found to be abundant at Grand Etang, completing for this species a chain of localities from Eastern Harbour to Point Tupper, and Pirate Harbour to Pugwash.

CHARACEAE.

Nitella flexilis Ag.	Between Antigonish and Lochaber, No. 467.
Chara vulgaris L.	Glendyer, Mabou, No. 287.
C. fragilis Desv.	N. E. Margaree, No. 330.

FUNGI.

Phycomycetes.

ALBUGINACEAE.

Albugo candida (Pers.) Kuntze	Pictou, No. 463a. On *Sisymbrium officinale* Det. by Mr. G. W. Wilson.

BRYOPHYTA.

Hepaticae.

DET. BY DR. M. A. HOWE.

MARCHANTIACEAE.

Conocephalum conicum (L.) Dumort.	Mabou, No. 295.
Preissia quadrata (Scop.) Nees .	Mabou, No. 236.
Marchantia polymorpha L. . .	Mabou, No. 226.

METZGERIACEAE.

Pellia sp.	Cape Mabou, No. 309.

JUNGERMANNIACEAE.

Ptilidium ciliare (L.) Nees . .	McDonald's Barren, No. 374.

Musci.

DET. BY MRS. E. G. BRITTON AND MR. R. S. WILLIAMS.

SPHAGNACEAE.

Sphagnum cymbifolium Ehrh. . .	Mabou, No. 326.

DICRANACEAE.

Dicranum scoparium (L.) Hedw. .	Mabou, No. 277.

POTTIACEAE.

Gymnostomum rupestre Schwaegr. .	Mabou, No. 237.

BRYACEAE.

Leptobryum pyriforme (L.) Wils. .	Mabou, No. 225.

POLYTRICHACEAE.

Polytrichum ohioense Ren. & Card. .	Cape Mabou, No. 307.
P. commune L.	Cape Mabou, No. 308.

HYPNACEAE.

Thuidium Philiberti Limpr. . .	Mabou, No. 275 ; N. E. Margaree, No. 341. Det. by Dr. G. N. Best.
Plagiothecium denticulatum (L.) Br. & Sch.	Mabou, No. 274.
P. striatellum Lindl. . . .	Mabou, No. 276.
Hypnum curvifolium Hedw. . .	N. E. Margaree, No. 342.

PTERIDOPHYTA.

OPHIOGLOSSACEAE.

Botrychium Matricariae Spr. . .	Between Margaree and Cheticamp, No. 387. Det. by Prof. L. M. Underwood.

LYCOPODIACEAE.

Lycopodium lucidulum Michx. .	McDonald's Barren, No. 364.
L. annotinum L.	Between Margaree and Cheticamp, No. 388.
L. clavatum L.	McDonald's Barren, No. 363.

ISOETACEAE.

Isoetes echinospora Braunii (Durieu) Engelm.	N. E. Margaree, No. 335. Det. by Mr. A. A. Eaton.

SPERMATOPHYTA.

Gymnospermae.

PINACEAE.

Larix laricina (Du Roi) Koch	Grand Etang, No. 411.
Juniperus nana Willd.	McDonald's Barren, No. 365.

TAXACEAE.

Taxus canadensis Marsh.	Pictou, No. 211.

Angiospermae.

MONOCOTYLEDONES.

SPARGANIACEAE.

Sparganium eurycarpum Engelm.	Mabou, No. 227.
S. fluctuans (Morong) B. L. Robinson	Millstream, No. 506.
S. simplex Huds.	N. E. Margaree, No. 381.

NAIADACEAE.

Potamogeton Nuttallii Cham. & Schl.	Millstream, No. 507.
P. pusillus L.	Mabou, No. 264.

SCHEUCHZERIACEAE.

Triglochin palustris L.	Inverness, No. 315.
T. maritima L.	Inverness, No. 320.

ALISMATACEAE.

Alisma Plantago-aquatica L.	Pictou, No. 526.
Sagittaria latifolia Willd.	Lochaber, No. 472.

VALLISNERIACEAE.

Vallisneria spiralis L.	Friar's Head, No. 403.

GRAMINEAE.

DETERMINED OR VERIFIED BY MR. G. V. NASH.

Chaetochloa viridis (L.) Scribn.	Pictou, No. 481.
Cinna latifolia (Trev.) Griseb.	Pictou, No. 212.
Calamagrostis Pickeringii A. Gr.	Peter's Barren, No. 369.
Agrostis coarctata Ehrh.	Mabou, No. 224.
A. hyemalis (Walt.) B. S. P.	Mabou, No. 258.
Spartina cynosuroides (L.) Willd.	Mabou, No. 284.
Phragmites Phragmites (L.) Karst.	Friar's Head, No. 412.
Poa pratensis L.	Mabou, No. 249.
Panicularia obtusa (Muhl.) Kuntze ?	Peter's Barren, No. 372.

Not typical but nearer this species than to *P. canadensis.*

Agropyron repens (L.) Beauv.	Mabou, No. 261.

CYPERACEAE.

Eleocharis palustris (L.) R. & S.	Lochaber, No. 473.
E. palustris glaucescens (Willd.) A. Gr.	N. E. Margaree, No. 345.
E. obtusa Schult.	Belle Cote, Margaree, No. 417.
Scirpus nanus Spreng.	Mabou, No. 251.
S. americanus Pers.	Mabou, No. 262.
S. validus Vahl	Mabou, No. 280.
Scirpus rubrotinctus Fernald	Mabou, No. 286.
S. cyperinus (L.) Kunth	Mabou, No. 303.
Eriophorum virginicum L.	McDonald's Barren, No. 353; Pictou, No. 446. Alpine species of this genus were also seen on McDonald's Barren, but were too advanced for determination, and not collected.
Rhynchospora alba (L.) Vahl	McDonald's Barren, No. 347.
Carex abacta Bailey	Pembroke Lake, No. 398.
C. intumescens Rudge	Peter's Barren, No. 371.
C. lurida Wahl.	Pictou, No. 445.
C. pseudo-cyperus L.	Mabou, No, 278a.
C. Goodenovii J. Gay	Mabou, No. 248; Pictou, No. 420.
C. gynandra Schwein.	Mabou, No. 278.
C. stipata Muhl.	Mabou, No. 256.
C. trisperma Dewey	Mabou, No. 272; N. E. Margaree, No. 367.
C. scoparia Schk.	Pictou, No. 430.
C. straminea echinodes Fernald	Mabou, No. 273.

ARACEAE.

Calla palustris L.	Pictou, No. 443.

LEMNACEAE.

Spirodela polyrhiza (L.) Schleid.	Mabou, No. 329.
Lemna minor L.	Mabou, No. 288.

ERIOCAULACEAE.

Eriocaulon septangulare With.	Pembroke Lake, No. 396.

PONTEDERIACEAE.

Pontederia cordata L.	Millstream, No. 509.

JUNCACEAE.

Juncus bufonius L.	Mabou, No. 246.
J. nodosus L.	Mabou, No. 238; N. E. Margaree, No. 344.
J. canadensis J. Gay	Friar's Head, No. 404.
J. canadensis brevicaudatus Engelm.	McDonald's Barren, No. 360.
Juncoides campestre (L.) Kuntze	Pictou, No. 418.

CONVALLARIACEAE.

Clintonia borealis (Ait.) Raf.	Pictou, No. 213.
Streptopus amplexifolius (L.) DC.	Pictou, No. 219.
S. roseus Michx.	Mabou, No. 293.

IRIDACEAE.

Sisyrinchium angustifolium Miller	Inverness, No. 319; Pictou Landing, No. 450.

ORCHIDACEAE.

Gymnadeniopsis clavellata (Michx.) Rydb.	Between Margaree and Cheticamp, No. 386; Pictou, No. 435.
Limnorchis media Rydb.	Glendyer, Mabou, No. 290.
Blephariglottis blephariglottis (Willd.) Rydb.	Peter's Barren, No. 366.
B. lacera (Michx.) Rydb.	Cape Mabou, No. 305.
B. psycodes (L.) Rydb.	Cape Mabou, No. 306.
Ibidium plantagineum (Raf.) House	Between Margaree and Cheticamp, No. 385.
I. cernuum (L.) House	Pictou, No. 206; Inverness, No. 312.
I. gracile (Bigel.) House	Grand Etang, No. 406.
Achroanthes unifolia (Michx.) Raf.	Pictou, No. 426.
Corallorhiza multiflora Nutt.	Pictou, No. 218.

DICOTYLEDONES.

MYRICACEAE.

Myrica Gale L.	Lochaber, No. 471.
M. carolinensis Miller	Grand Etang, No. 400.

BETULACEAE.

Alnus Alnobetula (Ehrh.) K. Koch	Island, No. 513.
A. incana (L.) Willd.	Loch Broom, No. 465.

MORACEAE.

Humulus Lupulus L.	Thicket beside East River, Island, Pictou Co., No. 516, thoroughly established.

LORANTHACEAE.

Razoumofskya pusilla (Peck) Kuntze Point Cross, Cheticamp, No. 416, on *Picea Mariana.* This is the most northerly station from which it has yet been recorded in Nova Scotia, but it is doubtless found throughout the eastern part of the province, especially near the coast. It is best known around Pictou, where attention was first called to it by Dr. C. D. Howe, who found it at Bay View, while on a collecting trip for the New York Botanical Garden, in 1902. It is very abundant on both sides of the entrance to Pictou Harbour, where it has destroyed several fine trees, and occurs also at Saw Mill Creek, Toney River, Cape John and Plainfield. It is also found at Cape George, Antigonish Co., and in various places between Hastings and Creignish, and from Mabou to Strathlorne, Inverness. In 1891, the late A. C. L. Oliver showed me a large growth near the top of a spruce and informed me that Prof. Lawson had told a Dalhousie class that it was due to a species of mistletoe. This can only refer to the present plant, so it must also be found at Halifax.

It is further curious that this northern outlier of a great tropical family should be the first plant to flower in spring. The season of 1903 at Pictou was unusually cold and late, yet many staminate flowers of the dwarf mistletoe were found fully developed by the middle of March, a full month before *Alnus incana*, always considered the earliest flowering plant in the region. In spite of careful search no pistillate flowers were found, and later in the spring the exposed parts of the plants disappeared. The fruit is found in the fall, so if these necessarily incomplete observations should be confirmed, enquiry into its life history may yield interesting results. It may also be suggestive that infected branches often show a very large number of mistletoe plants at the junction between the last and next to the last year's wood. The host plants noted in Nova Scotia are the black and the white spruce, but almost exclusively the former.

POLYGONACEAE.

Rumex Britannica L. ?	Mabou, No. 255.
R. crispus L.	Mabou, No. 254
Polygonum amphibium L	Friar's Head, No. 401 ; Millstream, No 508.
P. pennsylvanicum L.	Pictou, No. 422
P. cilinode Michx.	N. E Margaree, No. 377.
P. sagittatum L	Mabou, No. 302.

CHENOPODIACEAE

Atriplex hastata L.	Mabou, No. 325
Dondia americana (Pers.) Britton	Inverness, No. 318.
Salsola Kali L.	Eastern Harbour, No. 415.

AMARANTHACEAE.

Amaranthus retroflexus L.	Pictou, No. 478 Also seen at Windsor Junction.

CARYOPHYLLACEAE.

Silene vulgaris (Moench) Garcke	Springville, No. 498.
Saponaria officinalis L.	Pictou, No. 493.
Alsine graminea (L.) Britton	Pictou, No. 424.
Sagina procumbens L.	Pictou, No. 209 ; N. E. Margaree. No. 340.
Spergula arvensis L.	Pictou, No. 432.
Tissa canadensis (Pers.) Britton	Mabou, No. 245.
T. rubra (L.) Britton	Pictou, No. 529.

NYMPHAEACEAE.

Brasenia purpurea (Michx.) Casp.	Millstream, No. 510.
Nymphaea advena Soland.	McDonald's Barren, No. 355, (seedlings)
Castalia odorata (Dryand.) Woodv. & Wood.	Pembroke Lake, No 393 ; Millstream, No. 512.

RANUNCULACEAE.

Actaea rubra (Ait.) Willd.	West River, No 486.
Delphinium Ajacis L.	Pictou, No. 476.
Clematis virginiana L.	N E. Margaree, No. 332 ; Springville, No. 501.
Ranunculus reptans L.	Pembroke Lake, No. 392.
Batrachium trichophyllum (Chaix) Bossch	N. E Margaree, No 331.
Oxygraphis Cymbalaria (Pursh) Prantl	Mabou, No. 242
Thalictrum polygamum L.	Mabou, Nos. 230, 257.

CRUCIFERAE.

Lepidium ruderale L.	Pictou, No. 477.
Sisymbrium officinale (L.) Scop.	Pictou, No 463.
Cakile edentula (Bigel.) Hook.	Inverness, No 311.
Diplotaxis muralis (L.) DC.	Pictou Landing, No 455
Brassica juncea (L.) Cosson	Pictou, No 423 ; Pictou Landing, No 454.
Cardamine pennsylvanica Muhl.	Pembroke Lake, No 397.

DROSERACEAE.

Drosera rotundifolia L.	McDonald's Barren, No 349.
D. intermedia Hayne	McDonald's Barren, No 348.

CRASSULACEAE.

Sedum Fabaria Koch	N. E. Margaree, No. 383.

SAXIFRAGACEAE.

Mitella nuda L.	Mabou, No 294

GROSSULARIACEAE.

Ribes lacustre (Pers.) Poir.	Mabou, No. 291.

ROSACEAE.

Spiraea latifolia (Ait.) Borkh.	Inverness, No. 314 ; between Antigonish and Lochaber, No. 469 ; Springville, No. 503.
S. tomentosa L.	Pictou, No. 428. Very common in Pictou Co., but not observed in Cape Breton, though especially watched for.

Rubus Chamaemorus L.	McDonald's Barren, No. 354.
R. triflorus Richards.	N. E. Margaree, No. 379 ; Springville, No. 495.
R. strigosus Michx.	West River, No. 488.
R. Randii (Bailey) Rydb. ?	Pictou, No. 528
R. canadensis L.	Mabou, No. 232 ; between Antigonish and Lochaber, No. 468.
R. nigricans Rydb.	Springville, No. 494.
R. hispidus L.	Pictou, No. 531.
Sibbaldiopsis tridentata (Soland.) Rydb.	Grand Etang, No. 405.
Fragaria americana (Porter) Britton	Mabou, No. 292.
Comarum palustre L.	Inverness, No. 316.
Argentina Anserina (L.) Rydb.	Mabou, No. 247
Potentilla argentea L.	East River Loading Ground, No. 525. Abundant in at least some localities in Western N. S., but in the east only known to me from the one mentioned.
P. monspeliensis L.	Inverness, No. 317.
P. canadensis L.	Pictou, No. 437.
Geum canadense Jacq.	Mabou, No. 231 ; West River, No. 485.
Agrimonia hirsuta (Muhl.) Bicknell	Mabou, No. 233.
Sanguisorba canadensis L.	Inverness, No. 317A, (one specimen seen) ; abundant along the Margaree, No. 339, and at Cheticamp, also on the eastern coast at Ingonish and Aspy Bay.
Rosa lucida Ehrh.	Mabou, No. 281 ; Grand Etang, No. 399.

POMACEAE.

Sorbus americana Marsh.	Springville, No. 505.
Aronia atropurpurea Britton	Pictou, No. 429.
Amelanchier canadensis (L.) Medic.	N. E. Margaree, No. 376 ; Pictou, No. 439.
Crataegus Brunetiana Sarg.	Mabou, No. 234 ; Saltsprings, Antigonish Co., No. 466. The most widely distributed native species of the genus in eastern Nova Scotia.
C. Randiana Sarg.	Island, No. 519.

DRUPACEAE.

Prunus virginiana L.	Lochaber, No. 470 ; Springville, No. 504.

PAPILIONACEAE.

Medicago lupulina L.	Pictou, No. 447.
Melilotus alba Desv.	Pictou Landing, No. 459.
M. officinalis (L.) Lam.	Pictou Landing, No. 460.
Trifolium procumbens L.	Pictou, No. 210.
Meibomia canadensis (L.) Kuntze	West River, No. 484. Occurs also on East and Middle Rivers.
Vicia hirsuta (L.) Koch	Pictou Landing, No. 456.
Lathyrus palustris L.	Inverness, No. 313.
Falcata comosa (L.) Kuntze	West River, No. 489. Probably the species reported from here as *Apios tuberosa.* Seen also at Ferrona.

GERANIACEAE.

Geranium Robertianum L.	Mabou, No. 228.

OXALIDACEAE.

Oxalis stricta L.	Springville, No. 499.

EUPHORBIACEAE.

Euphorbia Helioscopia L.	Pictou, No. 444.

CALLITRICHACEAE.

Callitriche palustris L.	Mabou, No. 328.

EMPETRACEAE.

Empetrum nigrum L.	McDonald's Barren, No 352.

ANACARDIACEAE.

Rhus hirta (L.) Sudw.	Antigonish, No. 475.
R. radicans L.	Ferrona, No. 522.

AQUIFOLIACEAE.

Ilex verticillata (L.) A. Gray?	Pictou, No. 440.

ACERACEAE.

Acer spicatum Lam.	Island, No. 517.

BALSAMINACEAE.

Impatiens biflora Walt.	N. E. Margaree, No. 337.

MALVACEAE.

Malva moschata L.	N. E. Margaree, No. 343.

HYPERICACEAE.

Hypericum ellipticum Hook.	Springville, No. 496.
H. perforatum L.	Mabou, No. 297.
H. canadense L.	Pembroke Lake, Nos. 390, 391.
Triadenum virginicum (L.) Raf.	Mabou, No. 267.

VIOLACEAE.

Viola incognita Brainerd	Mabou, No. 268.
V. blanda Willd., northern form.	Mabou, No. 268A. This and the preceding were identified by President Brainerd. Both are wood violets, the common meadow white violet known until recently in Nova Scotia as elsewhere under the name of *V. blanda* being really *V. pallens* (Banks) Brainerd.
V. labradorica Schrank.	N. E. Margaree, No. 378.
V. sp.	Probably a hybrid of *V. septentrionalis* and *V. cucullata*, Pictou, No. 421.

ONAGRACEAE.

Isnardia palustris L.	West River, No. 490.
Epilobium palustre L.	Pictou, No. 217.
E. adenocaulon Haussk.	Mabou, No. 263.
Kneiffia pumila (L.) Spach	Pictou, No. 442.
Circaea alpina L.	Pictou, No. 216.

HALORAGIDACEAE.

Myriophyllum spicatum L.	N. E. Margaree, No. 333.
M. alterniflorum DC.	Millstream, No. 511.

ARALIACEAE.

Aralia nudicaulis L.	Pictou, No. 221.

UMBELLIFERAE.

Sanicula marilandica L.	West River, No. 487.
Washingtonia Claytoni (Michx.) Britton	Mabou, No. 229.
Cicuta maculata L.	Mabou, No. 259.
Angelica atropurpurea L.	Mabou, No. 235.
Pastinaca sativa L.	Mabou, No. 253.

CORNACEAE.

Cornus canadensis L.	McDonald's Barren, No. 356.
C. stolonifera Michx.	Springville, No. 497.
C. alternifolia L. f.	Lochaber, No. 474 ; Eureka, No. 520.

PYROLACEAE.

Moneses uniflora (L.) A.Gray	Pictou, No. 215.

MONOTROPACEAE.

Monotropa uniflora L.	Mabou, No. 289.

ERICACEAE.

Rhodora canadensis L.	Pictou, No. 431.
Kalmia angustifolia L.	McDonald's Barren, No. 350 B.
K. glauca Ait.	McDonald's Barren, No. 350 A.
Andromeda Polifolia L.	McDonald's Barren, No. 350.
Gaultheria procumbens L.	Grand Etang, No. 409.

VACCINIACEAE.

Gaylusaccia resinosa (Ait.) T. & G.	Pictou, No. 434.
Vitis-Idaea Vitis-Idaea (L.) Britton	Grand Etang, No. 407.
Chiogenes hispidula (L.) T. & G.	McDonald's Barren, No. 362.
Oxycoccus macrocarpus (Ait.) Pers.	Grand Etang, No. 408 ; Pictou, No. 438.

PRIMULACEAE.

Lysimachia terrestris (L.) B. S. P.	Mabou, No. 260.
Glaux maritima L.	Pictou Landing, No. 448.
Anagallis arvensis L.	Pictou, No. 462.

PLUMBAGINACEAE.

Limonium carolinianum (Walt.) Britton	Loch Broom, No. 491.

GENTIANACEAE.

Tetragonanthus deflexus (J. E. Smith) Kuntze	Between Margaree and Cheticamp, No. 384 ; Grand Etang, No. 410. As different in habit as in habitat.

MENYANTHACEAE.

Menyanthes trifoliata L.	Mabou, No. 327.
Limnanthemum lacunosum (Vent.) Griseb.	Pembroke Lake, No. 394.

APOCYNACEAE.

Apocynum androsaemifolium L.	Mabou, No. 304.
A. cannabium L.	Springville, No. 502.

CONVOLVULACEAE.

Convolvulus sepium L.	Mabou, No. 250.
C. arvenis L.	Pictou Landing, No. 458.

BORAGINACEAE.

Myosotis laxa Lehm.	Pictou, No. 207 ; Mabou, No. 243.

VERBENACEAE.

Verbena hastata L.	Forks East River, Ferrona, No. 521.

LABIATAE.

Scutellaria lateriflora L.	Mabou, No. 269.
S. galericulata L.	Mabou, No. 244.
Galeopsis Tetrahit L.	Mabou, No. 279.
Stachys palustris L.	Pictou, No. 433.
Clinopodium vulgare L.	N. E. Margaree, No. 380.
Lycopus membranaceus Bicknell	Mabou, No. 241.
L. americanus Muhl.	Pictou, No. 436.
Mentha canadensis L.	Mabou, No. 252.

SOLANACEAE.

Solanum Dulcamara L.	Mabou, No. 285.

SCROPHULARIACEAE.

Chaenorrhinum minus (L.) Lange	Pictou Landing, No. 461.
Chelone glabra L.	N. E. Margaree, No. 382.
Mimulus ringens L.	N. E. Margaree, No. 336.
Veronica scutellata L.	Pictou, Nos. 208, 527.
Euphrasia americana Wettst.	Mabou, No. 223.
Rhinanthus Crista-Galli L.	Mabou, No. 240.
Melampyrum lineare Lam.	McDonald's Barren, No. 358.

LENTIBULARIACEAE.

Utricularia cornuta Michx.	McDonald's Barren, No. 346.
U. vulgaris L.	N. E. Margaree, No. 334 ; Friar's Head, No. 402.

PLANTAGINACEAE.

Plantago lanceolata L.	Pictou, No. 464.
P. maritima L. ?	Eastern Harbour, No. 414.

A very peculiar form, closely approaching *P. borealis* Lange, which it more nearly resembles in habit, except that the spikes always overtop the leaves The capsule of *P. maritima* is said to be 2-seeded, that of *P borealis*, 4-seeded. Three out of 4 capsules from the Cheticamp plant had each 3 seeds, though in two cases one was less developed than the others, the fourth was probably 2-seeded. The bracts varied greatly on the same individual. *P. maritima* is frequent on the rocky cliffs along this coast, *P. borealis* is not reported from the province. The plants were dwarfed, growing amongst grass on the top of a bleak headland at the entrance to Eastern Harbour.

RUBIACEAE.

Galium triflorum Michx.	Mabou, No. 282 ; Springville, No. 500.
G. tinctorium L.	Pictou, No. 214 ; Mabou, Nos. 239, 271.
G. asprellum Michx.	Mabou, No. 270.

CAPRIFOLIACEAE.

Sambucus canadensis L.	Mabou, No. 266.
Viburnum Opulus L.	Island, No. 515.
V. cassinoides L.	McDonald's Barren, No. 357.
Linnaea americana Forbes	Pictou, No. 222.
Diervilla Diervilla (L.) MacM.	Ferrona Junction, No. 523.

CAMPANULACEAE.

Campanula intercedens Witasek	Eastern Harbor, No. 413 ; Island No. 518.
C. rapunculoides L.	Pictou, No. 480.
Lobelia Dortmanna L.	Pembroke Lake, No. 395.
L. inflata L.	Pictou, No. 441.

CICHORIACEAE.

Cichorium Intybus L.	Mabou, No. 324.
Tragopogon pratensis L.	Pictou, No. 479. Has apparently not spread as yet outside the town limits, but will likely be heard from later as a troublesome weed.
Sonchus arvensis L.	Mabou, No. 321.
S. oleraceus L.	Pictou, No. 482.
Hieracium Pilosella L.	Was not yet in flower, and was not collected, but it is desirable to call attention to it as a dangerous weed. It is thoroughly established on both sides of the mouth of Pictou Harbour, especially in the Sea View Cemetery. Also seen at Cape George, Antigonish Co , in 1903, but its hold seemed precarious.
H. canadense Michx.	McDonald's Barren, No. 361.
H. scabrum Michx.	Mabou, No. 265.

AMBROSIACEAE.

Ambrosia artemisiaefolia L.	Pictou Landing, No. 451.
Xanthium echinatum Murr.	Pictou Landing, No. 449.

COMPOSITAE.

Eupatorium perfoliatum L.	Pictou, No. 427.
Solidago macrophylla Pursh	Cape Mabou, No. 310.
S. Purshii Porter	McDonald's Barren, No. 351.
S. sempervirens L.	Loch Broom, No. 492.
S. juncea Ait.	Ferrona Junction, No. 524.

S. canadensis glabrata Porter	Cape Mabou, No. 300.
Aster puniceus L.	Cape Mabou, No. 301.
A. Radula biflorus (Michx.) Porter	McDonald's Barren, No. 359.
A. nemoralis Ait.	Peter's Barren, No. 368.
A. acuminatus Michx.	Pictou, No. 220.
A. paniculatus Lam.	Island, No. 514.
Erigeron ramosus (Walt.) B. S. P.	Mabou, No. 283.
Leptilon canadense (L.) Britton	Pictou Landing, No. 452.
Doellingeria umbellata (Mill.) Nees	N. E. Margaree, No, 338 ; Peter's Barren, No. 370.
Antennaria neodioica Greene	Between Margaree and Cheticamp, No. 389.
Anaphalis margaritacea (L.) B. & H.	Mabou, No. 299.
Rudbeckia hirta L.	Mabou, No. 298.
Bidens frondosa L.	Pictou, No. 419, No. 425, ? the latter specimen very far from typical.
Matricaria inodora L.	Mabou, No. 322.
Artemisia biennis Willd.	Pictou, No. 530.
A. vulgaris L.	Pictou Landing, No. 457.
Tussilago Farfara L.	Pictou, No. 483.
Senecio vulgaris L.	Mabou, No. 323.
S. viscosus L.	Pictou Landing, No. 453.
Carduus muticus (Michx.) Pers.	Source Middle River, Victoria Co., No. 375.

—NEW YORK BOTANICAL GARDEN.

MR. BAILLIE in his paper in the last number of THE BULLETIN seems to me to err in not distinguishing carefully between the flora of a peat bog such as the barrens north of Pictou town, and that of the high level bogs of Cape Breton. *Rubus Chamaemorus* is very abundant in many of the latter, and also occurs at various places on the Atlantic slope, but I do not know any authentic record of it from Pictou. The same statement applies to *Andromeda Polifolia*, but the latter may have been confused by him with one of the species of *Kalmia*. *Vaccinium corymbosum* is probably not found in Eastern Nova Scotia.

C. B. ROBINSON.

THE BULLETIN
of the
PICTOU ACADEMY SCIENTIFIC ASSOCIATION.

Notes on the Erysiphaceae and Perisporiaceae of Pictou.

The Club Mosses of Pictou County.

The Erysiphaceae of Pictou County.

PRINTED AT
THE OFFICE OF THE PICTOU ADVOCATE,
1909.

THE BULLETIN

OF THE

PICTOU ACADEMY SCIENTIFIC ASSOCIATION.

CONTENTS:

Notes on the Erysiphaceae and Perisporiaceae of Pictou.

The Club Mosses of Pictou County.

The Erysiphaceae of Pictou County.

PRINTED AT
THE OFFICE OF THE PICTOU ADVOCATE.
1909.

THE BULLETIN

VOL. 1. PICTOU ACADEMY, JUNE 1909. NO. 4.

THE PICTOU ACADEMY SCIENTIFIC ASSOCIATION was instituted in 1882, and during the earlier years of its existence much valuable work was done by the various clubs of which it was composed, in making collections of the local fauna and flora and in stimulating interest among the students of the institution in Scientific work. These collections have been largely preserved in the Museum of the Academy and have been added to from time to time since. In later years, however, the laboratory classes to a great extent ursurped the place of the old working clubs and the Scientific Association ceased to be a factor in the life of the Academy as a working organization. During the past session it was re-organized and in order that a record might be had of any work done by its members which might be of more general and permanent interest it was decided to publish bulletins from time to time, in which the results of such work might be preserved. The present number is the fourth of such publications.

Membership in the Association is open to all Academy students and alumni and to others, as associate members, who are interested in the work of the institution. A nominal fee of fifty cents per annum is exacted of members who wish to receive copies of the Bulletin as issued.

The officers for the current year are:

Hon. President:—R. McLellan, LL. D.
President—W. P. Fraser, B. A.
Vice-President—J. E. McVicar.
Sec'y-Treas.—H. F. Munro, B. A.

Executive—The Officers, Miss A. C. Bishop, Messrs. J. Cameron, J. Craigie and C. L. Moore, M. A.

All correspondence should be addressed to H. F. Munro, Pictou Academy, Pictou, Nova Scotia.

Notes on the Erysiphaceae and Perisporiaceae of Pictou.

H. H. Mussells and E. T. Parker, 1906—1907.

The Erysiphaceae, commouly known as White Mildews, may be easily recognized by the white, dusty or web-like coating they form on the leaves or other succulent parts of common plants. They reach their full development in the fall, when they may be seen scattered over the whitened surface of the leaves.

The mycelium consists of numerous slender white threads that branch widely and extend over the leaf in any direction. They send out at irregular intervals short branches (haustoria) which penetrate the epidermal cells, serving for the attachment of the fungus and probably also for its nourishment.

These haustoria present several forms and are of some importance in the classification of the species.

The conidia or asexual reproductive bodies are simple colorless cells, filled with protoplasm. They are formed by the division of vertical branches of the mycelium. The terminal cells soon become rounded off and the others follow in quick succession. Thus there is soon formed a row of spores or conidia. Soon after, these fall off, and, pushing out a new tube, germinate into a new plant.

In the summer or autumn, usually when the vitality of the plant begins to diminish, the formation of conidia is superseded by that of perithecia containing ascospores. Their function is to carry the fungus in a dormant condition over winter.

When young a perithecium is colorless. It soon becomes yellowish and when mature is dark brown or black, usually globose or globose-depressed, and large enough to be visible to the naked eye. It is provided with outgrowths, called appendages, very characteristic of this family. These present many forms, and, with the number of asci, are the characters on which the genera are based. The contained asci and spores escape in the spring by the irregular rupture of the wall of the perithecium. The asci are colorless sacs, stalked or sessile, the spores colorless and unseptate.

The following specimens have been examined :

Erysiphaceae.

1.—UNCINULA SALICIS D C. On *Salix discolor.* Amphigenous, very scanty on upper side of the leaves of the host.

2.—UNCINULA CIRCINATA C. & P. On *Acer rubrum;* about 16 asci; mycelium wanting.

3.—MICROSPHAERA VACCINII Schw. On *Epigaea repens*. Also on *Gaylussacia resinosa*.

4.—PODOSPHAERA OXYACANTHAE D C. On *Spiraea tomentosa*. Amphigenous; only one ascus; mycelium not abundant.

5.—MICROSPHAERA ALNI D C. On *Viburnum cassinoides* and *Syringa vulgaris*. Amphigenous; no mycelium.

6.—SPHAEROTHECA CASTAGNEI Lev. On *Bidens frondosa*.

7.—ERYSIPHE GALEOPSIDES D C.

8—ERYSIPHE COMMUNIS Wallr. On *Oenothera biennis*, *Scutellaria laterflora* and *Aquilegia communis*.

Perisporiaccae.

In this family the conidia-bearing mycelium is brown and persistent. The perithecia spherical or depressed, membraneous and always superficial.

1.—SACCARDIA QUERCINA Schw. On *Bidens*.

II.—DIMEROSPORIUM COLLINSII, Schw. On *Amelanchier canadensis*.

The Club Mosses of Pictou County.

MINNIE BERRINGER.—'09.

The following club mosses were collected within a radius of two miles of Pictou town. Three of them *L. inundatum. L, sitchense,* and *L. sabinaefolium* are rare. The first named was found only in two places which were low and wet. The other two, not reported before from Nova Scotia, were collected in April, 1909.

The remaining four species are very plentiful. The collection includes all species reported from Nova Scotia. The nomenclature is that of "Gray's New Manual of Botany."

Genus, **Lycopodium L.**

LYCOPODIUM LUCIDULUM Michx., commonly known as shining club moss on account of its dark green shining leaves. Grows in wet woods. In addition to bearing spores it is also propagated by bud-like organs known as gemnae which fall to the ground and become new plants.

LYCOPODIUM ANNOTINUM L. Owing to its rigidity in comparison with the other mosses it is called, stiff club moss. The leaves are of a paler green than the others; very common in all cool woods.

LYCOPODIUM CLAVATUM L. Known as common club moss or running pine; its stems extensively creeping; leaves are bristle-tipped; quite common in dry woods.

LYCOPODIUM OBSCURUM L. The variety *dendroideum* only was collected. It differs from *L. obscurum* chiefly in the number of spikes, there being from 1—15 on the variety and only 1—3 on the other. Commonly known as ground pine.

LYCOPODIUM CONPLANATUM L. Variety *flabelliforme* only was collected; unually known as trailing Christmas green; root-stock nearly superficial; leaves overlapping, having a lower leaf covering base of next higher and forming a flat surface; branches spreading in a fan-like manner. Found in dry, open woods.

LYCOPODIUM INUNDATUM L. Dwarfed, having sterile stems creeping and fertile stems erect; rare in this locality; found in low, wet places; hence sometimes called bog club moss.

LYCOPODIUM SITCHENSE Rupr. Also rare, not reported before from Nova Scotia, not easily distinguished from *L. sabinaefolium.*

LYCOPODIUM SABINAEFOLIUM Willd. In habit similar to *L. sitchense;* branches however are larger and leaves on lower surface smaller than those on upper; also reported for the first time from Nova Scotia.

The Erysiphaceae of Pictou County.

The study of a collection of *Erysiphaceae* was undertaken as special work by members of the "A" botany class. The collections were found to include all the genera, and many of the species likely to be found in Nova Scotia, so it was thought advisable to publish their work as an aid to beginners in the study of this interesting family. The members of the class and their part of the work was as follows:—

Podosphaera, John Cameron; *Uncinula*, Annetta Bishop; *Microsphaera*, Emily Spicer and Emeline MacKenzie; *Erysiphe*, John Craigie; *Phyllactinia*, Mabel McKay and Jean Henry.

The collections were made during the Summer and Fall of 1908 by W. P. Fraser, under whose supervision the work was done in the laboratory of Pictou Academy.

The ERYSIPHACEAE or Powdery Mildews have a world-wide distribution. They are most common in north temperate regions. Salmon in his Monograph reports 30 species and 7 varieties from North America. Of these from 20 to 25 species and 3 varieties are likely to occur in Nova Scotia. The collections here described include 15 species and 2 varieties, six of these *Sphaerotheca humili, S. mors-uvae, Microsphaera grossulariae, M. diffusa, M. Russellii* and *Erysiphe graminis* are reported for the first time from Nova Scotia.

The Powdery Mildews often cause destructive diseases of garden and field crops. The Bordeaux mixture, potassium sulphide solution and flowers of sulphur have been found effective in controlling their ravages. They do not seem to cause much damage in Nova Scotia.

In Dr. A. H. MacKay's "First Supplementary List: Fungi of Nova Scotia;" Proceedings and Transactions of the N. S. Institute of Science, C. L. Moore reports 13 species from Pictou County. Messrs. Mussells and Parker collected in the vicinity of Pictou during 1905. Their list of 8 species is published in this number of the BULLETIN.

The nomenclature and classification is that of Salmon in his "Monograph of the Erysiphaceae." Memoirs of the Torrey Botanical Club, No. 9. "Gray's New Manual of Botany" was used in determining the host plants. In a few cases of difficulty, specimens of the host plants were submitted to Dr. John Macoun, Naturalist, Geol. Survey, Ottawa.

The description of the family is largely based on Salmon's Monograph. Measurements, enclosed in brackets, in the descriptions of the species are also adopted from that work.

Erysiphaceae Lev.

Parasitic on flowering plants; vegetative mycelium white but becoming brown in some species with age, external to the host plant and adhering to it by means of haustoria, or (*Phyllactinia*) sending special branches of the mycelium into the stomata of the host plant, and from these branches haustoria enter the surrounding cells; hyphae much branched and interwoven; conidia large, one celled, borne on erect, simple conidiophores; perithecia sessile, at first colorless, then yellow, becoming dark brown or black, indehiscent, globose or somewhat flattened; appendages springing from the outer wall of perithecium, similar to the mycelium or quite distinct, simple or definitely branched at the apex, sometimes colored; asci arising from the base of the perithecium, one or many, colorless, usually stalked; spores 2—8, non-septate, colorless.

KEY TO GENERA.

Appendages of the perithecium similar to the mycelium and often interwoven with it, not branched in a definite manner at the apex.

One ascus.................................... Sphaerotheca.
Several asci...................................... Erysiphe.

Appendages of the perithecium unlike the mycelium, not interwoven with it, coiled at the tips, needle shaped and expanded at the base or branched in a definite manner.

Appendages simple

Coiled at apex ....Uncinula.
Needle-shaped and swollen at base...Phyllactinia.

Appendages branched in a definite manner at apex.

One Ascus .... Podosphaera.
Several Asci .... Microsphaera.

Podosphaera Kunze.

Perithecia with a single ascus; appendages dichotomously branched at the apex; spores 8.

PODOSPHAERA OXYACANTHAE (D C.) de Bary.

Amphigenous, mycelium persistent, effused; perithecia scattered, sub-globose, 74—100 microns in diameter; appendages variable in length even on the same perithecium; 4—20 in number, about twice as long as the diameter of the perithecium, septate, dark brown for more than half their length, smooth, thick walled, apex usually four times dichotomously branched, ultimate branches rounded or knob-shaped; ascus broadly ovate or oval, variable in size, 60-70x46-56 microns; spores 8, 8-11x20-22 microns.

On *Spireae tomentosa; S. latifolia; Pyrus melanocarpa;* Pictou.

This mildew is common in the hosts named above in the vicinity of Pictou. The appendages average larger on *Pyrus melanocarpa* than on the others. It may also be looked for on *Crataegus*.

P. OXYACANTHAE is known as the cherry or apple powdery mildew as it frequently attacks these trees. *P. biuncinata* on *Hamamelis virginiana* has been reported from Ontario and may occur in Nova Scotia. It can be easily recognized by its long, spreading colorless appendages usually only once branched.

Sphaerotheca Lev.

Perithecia sub-globose; ascus solitary, 8-spored; appendages brown or colorless, spreading horizontally, simple or vaguely branched, often interwoven with the mycelium, sometimes obsolete.

KEY TO NOVA SCOTIA SPECIES OF SPHAEROTHECA.

Perethecia immersed in thick and dense dark brown mycelium.........3. *S. mors-uvae*
Mycelium not thick and dense.
    Cells of outer wall of perithecium 10-20 microns wide ....*1. S. humili*
    Cell of outer wall of perithecium 20-30 microns wide.........*2. S. humili fuliginea*

1. SPHAEROTHECA HUMILI (D C.) Burr.

Amphigenous; mycelium disappearing or persistent; perithecia scattered or gregarious, about 80-100 microns in diameter, cells small; appendages variable in number and in length, colored brown or rarely white; ascus elliptical to subglobose (45-90x50-70 microns); spores 8, averaging 22x15 microns.

On *Agrimonia gryposepala*, New Glasgow; *Rosa sp.*, New Glasgow, Loch Broom; (*Rubus ideaus* var. *aculeatissimus*, Truro.)

The form on *Rosa* has been commonly reported in America as *S. pannosa.* Salmon place it in this species. The white, shining appendages make it a very marked form.

2. SPHAEROTHECA HUMILI, var. FULIGINEA (Schl.) Salmon.

Perithecia usually smaller with larger cells.

On *Bidens frondosa*, New Glasgow, Durham, Pictou, Piedmont; *Bidens cernua*, Pictou; *Taraxicum officinale*, New Glasgow; *Prunella vulgaris*, Piedmont; *Prenanthes altissima*, Pictou, New Glasgow, Durham.

This variety is regarded by some botanists as a separate species. *S. Castagnei Lev.*

3. SPHAEROTHECA MORS-UVAE (Schwein) Berk. & Curtis.

Amphigenous; Mycelium persistent forming dense patches which become brown; perithecia gregarious, immersed in the mycelium, subglobose, averaging 75 microns in diameter; appendages few, pale brown, ascus (70-90x50-62 microns,) Spores 20-25x12-15 microns.

On *Ribes nigrum*, Pictou.

This species causes the diseases of gooseberries so troublesome in America and is known as the "gooseberry mildew". It attacks the fruit and destroys it. It has not been reported as troublesome in Nova Scotia.

Uncinula Lev.

The genus *Uncinula* is distinguished from the other genera of the *Erysiphaceae* by the uncinate or coiled tips of the appendages; the perithecia are usually globose or lenticular and the appendages simple and usually colorless.

KEY TO NOVA SCOTIA SPECIES OF UNCINULA.

Asci 4-6 spored ....*U. circinata*
Asci 8 spored ....*U. salicis*

1. UNCINULA CIRCINATA Cooke & Peck.

Hypophyllous, sometimes amphigenous; mycelium sub-persistent, effused; perithecia scattered, globose or lenticular, 144-168 microns in diameter; appendages many, slightly longer than the diameter of the perithecium, colorless, thin walled, unseptate, simple coiled at tips; asci numerous, oval 68-75x24-34 microns; spores 8, about 11x19 microns.

On *Acer rubrum*, Scotsburn.

2. UNCINULA SALICIS (D C.) Winter.

Amphigenous; mycelium persistent or evanescent, effused; perithecia scattered, globose or lenticular, 112-144 microns in diameter, appendages many, about equal in length to the diameter of the perithecium, smooth, colorless, thin walled, unseptate, coiled at tips; asci numerous, 55-63x38-41 microns; spores 4-6.

On *Salix*, New Glasgow, Scotsburn.

These two specimens are much alike in appearance. They can be separated easily by the number of spores in the asci.

Collections of a mildew on *Populus tremuloides* were made at Pictou and Abercrombie, but the specimens were lost. The mildew was probably *U salicis*.

Besides the species described *U. necator*, the vine mildew which has colored appendages, *U. macrospora* with two spored asci, and *U. flexuosa* with flexuose appendages may occur in Nova Scotia.

Microsphaera Lev.

Perithecia with several asci; appendages not interwoven with the mycelium, more or less dichotomously branched at the apex; asci 2-8 spored.

KEY TO NOVA SCOTIA SPECIES OF MICROSPHAERA.

Tips of appendages recurved when mature.
Appendages short ⅔-2½ times diameter of the peritheclum............*1, M. alui*
Appendages long, more than 2½ times the diameter of the
perethicum...*2. M. alui vaccinii*

Tips of appendages not recurved when mature.
  Appendages colored ....5. *M. Russellii*
  Appendages hyaline.
    Appendages 2-7 times the diameter of the perithecium, branching lax ....4. *M. diffusa*
    Appendages less than 2 times the diameter of the perithecium..3. *M. grossulariae*

1. MICROSPHAERA ALNI (Wallr.) Winter.

Amphigenous; mycelium evanescent or persistent, effused; perithecia globose-depressed, 72-114 microns in diameter; appendages 5-25 in number; ⅔-2½ diameter of the perithecium, generally rigid, smooth, colorless or slightly brown at base, usually aseptate, apex 3-6 times branched, tips of branches recurved; asci 3-8, ovate or oval 35-55x24-44 microns, usually short stalked; spores 4-8, (18-23x 10-12 microns.)

On *Syringa vulgaris*, Pictou, New Glasgow, Durham. *Alnus incana* and *Alnus crispa*, Abercrombie; *Corylus rostrata* and Ilex *verticillata* var. *tenuifolia*, Scotsburn; (*Betula lutea*, Truro.)

M. erinophila Pk. a form with colored appendages which occurs on the leaves of *Fagus ferruginea* is classed with *M. alni* by Salmon. He considers the presence or absence of color in the appendages as of no systematic value.

On a single shrub of *Alnus crispa* no less than three mildews were collected. The leaves were covered on the under side with *M. alni* and *Phyllactinia corylea*, and the fertile aments with *Erysiphe graminis*.

2. MICROSPHAERA ALNI var, VACCINII (Schwein,) Salmon.

Epiphyllous or rarely amphigenous; mycelium persistent, thin and effused, perithecia scattered, globose, 72-96-microns in diameter; appendages 3-16, 5-9-times the diameter of the perithecium, thin walled and delicate, flexuose, 3-4 times dichotomously branched, tips of ultimate branches recurved; asci 2-13, about 31x55 microns ovate or ovate-oblong, spores 4-6.

On *Epigaea repens*, Durham, Pictou; *Vaccinium Canadense*, Pictou, Loch Broom; *Gaylussacia resinosa*, Pictou.

American botanists regard this variety as a separate species. It can be easily distinguished from *M. alni* by the long flaccid appendages. It is common in the vicinity of Pictou on the huckleberry. Specimens were also collected on *Lonicera* which may belong here, but they need further study.

3. MICROSPHAERA GROSSULARIAE (Wallr,) Lev.

Amphigenous; mycelium sub-persistent or evanescent, thin and effused; perithecia globose-depressed, usually 80-100-microns in diameter, appendages 5-15 in number, 1-1¾ diameter of perithecium, thick walled at base, thin at apex, smooth, colorless, aseptate, apex dichotomously branched 4-5 times, ultimate branches straight and rather long, tips not recurved; asci 4-10, about 55x33 microns, broadly ovate, short stalked; spores 4-6.

On *Sambucus canadensis*, New Glasgow, Pictou, Scotsburn.

The branching of the apex of the appendages presents a digitate appearance. The species is a well marked and beautiful one. In Europe *M. grossulariae* causes a disease of gooseberries. It does not attack them in North America.

4. MICROSPHAERA DIFFUSA Cooke & Peck.

Amphigenous; mycelium sub-persistent or evanescent, effused; perithecia epiphyllous, scattered, about 70-100 microns in diameter; appendages variable in number and in length, 2-7 times the diameter of the perithecium, smooth, aseptate, (or 1-3 septate) pale brown near base, apex dichotomously or sub-dichotomously branched, branching irregular, tips of ultimate branches not recurved; asci usually about 6, about 55x20 microns, ovate oblong, short stalked, spores usually 4.

On *Desmodium canadense*, Durham.

A good specific distinction is found in the irregular, diffuse branching of the appendages. Sometimes the branches appear as lateral outgrowths. It is very variable in most of its characters.

5. MICROSPHAERA RUSSELLII Clinton.

Amphigeneous; mycelium evanescent or sub-persistent, effused; perithecia scattered, globose-depressed, 56-100 microns in diameter; appendages 8-15, 4-6 times the diameter of the perithecium, smooth, colored dark brown nearly to the apex, septate, thick walled, flexuose, 2-4 times dichotomously branched at the apex, branching lax and irregular, ultimate branches not recurved; asci about 4-7, averaging 52x27 microns, ovate-oblong, short-stalked, spores usually 4, (18-22x10-12 microns.)

On *Oxalis corniculata* var. *stricta*, New Glasgow, Scotsburn.

This species is sharply marked off from all other species of this genus by its long, flaccid, colored appendages. They mature slowly so that the branching appears late in the season.

Erysiphe D C.

Perithecia globose or globose-depressed; asci several, 2-8 spored, appendages resembling the mycelium and often interwoven with it, sometimes absent.

KEY TO NOVA SCOTIA SPECIES OF ERYSIPHE.

Perithecia immersed in the persistent mycelium; asci usually without spores..4. *E. graminis*

Perithecia not immersed in mycelium.
Asci 2 spored, haustoria not lobed ....2. *E. cichoracearum*
Asci without spores, haustoria lobed...............3. *E. galeopsidis*
Asci 3-8 spored.
Perithecia small, usually about 90 microns, asci few, 2-8 usually .... 1. *E. polygoni*
Perithecia large, usually about 280 microns, asci usually about 20...............5. *E. aggregata*

1. ERYSIPHE POLYGONI D C.

Amphigenous; mycelium variable, persistent, thin, effused or thick and dense or evenescent; perithecia scattered or gregarious, usually about 90 microns in diameter; appendages variable in number and length, usually several times the diameter of the perithecium, flexuose and interwoven with the mycelium, usually brown at base; asci 3-8, variable (46-72x30-45 microns,) spores 3-8, (19-25x9-14 microns.)

On *Ranunculus acris*, New Glasgow; *Thalictrum*, Scotsburn, Lyon's Brook; *Oenothera biennis*, Pictou, Scotsburn; *Aquilegia vulgaris*, Pictou.

E. Polygoni (*E. communis* of many authors) is found on *Thalictrum* in shaded situations. On this host it forms dense pannose patches on the leaves and stem on which the perithecia are embedded. The other collections did not show this feature, the mycelium being thin or evanescent at maturity.

2. ERYSIPHE CICHORACEARUM D C.

Amphigenous; mycelium persistent or evanescent, white; perithecia scattered or gregarious, 90-150 microns in diameter; appendages variable in length, septate, light or dark brown throughout; asci numerous, 8-30, stalked, 57-80x27-40; spores usually 2, rarely more, about 24x13 microns.

On *Aster* species, Scotsburn, Pictou, Lyon's Brook; *Solidago flexicaulis*, Scotsburn; *Solidago* species, Pictou, New Glasgow; [*Eupatorium perfoliatum*, Truro;] *Scutellaria lateriflora*, Pictou; *Plantago major*, Pictou, New Glasgow, Scotsburn, Piedmont.

E. cichoracearum is very common on *Solidago* and *Aster* as well as on *Plantago*. It is doubtless generally distributed. This species can be recognized by the numerous, regularly 2-spored asci. It has often been confused with *E. polygoni*.

A mildew was collected at Truro, [Col. Co.,] on *Lactuca* which was probably this species. It was parasitised by *Ampelomyces quisqualis*.

3. ERYSIPHE GALEOPSIDIS D C.

On *Chelone glabra*, Pictou, Durham and New Glasgow.

E. galeopsides differs from *E. cichoracearum* only in the absence of spores and the presence of lobed haustoria. It is common on *Chelone* in shaded places.

4. ERYSIPHE GRAMINIS D C.

Epiphyllous: mycelium persistent, forming patches in which the perithecia are immersed; perithecia large about 200 microns in diameter; appendages rudimentary; asci numerous; spores usually none [4 or 8 when present.]

On undetermined grass, Pictou.

E. graminis is characterized by the large perithecium and the numerous asci. It occasionally causes serious damage to grain crops. It is confined to the grasses. [*Gramineae*.]

5. ERYSIPHE AGGREGATA [Peck] Farlow.

Mycelium vanishing or persistent; perithecia densely gregarious, globose-depressed, variable in size; appendages numerous, interwoven, branched, colorless, 1-4 times diameter of perithecium in length. About 200 microns in diameter; asci numerous, usually about 20, large, oblong-ovate to cylindrical. About 100x35 microns; spores 8, somewhat round or oval 12-15x14-18 microns.

On *Alnus incana*, Pictou, Abercrombie, New Glasgow. *Alnus crispa*, Abercrombie.

The present species is very common on the female catkins of *Alnus incana* in the vicinity of Pictou. Only one collection was made on *Alnus crispa*. The catkins attacked do not attain their full size or mature seed.

Phyllactina Lev.

Perithecia with simple needle-shaped appendages with a swollen base; asci several.

PHYLLACTINIA CORYLEA [Pers.] Karst.

Usually hypophyllous, rarely amphigenous; mycelium persistent or evanescent; perithecia scattered or somewhat gregarious, large, globose or globose-depressed, 190-275 microns in diameter; appendages usually 6-12, 1-3 times the diameter of the perithecium, smooth, acicular, straight, aseptate, colorless, swollen at base into a bulb; asci numerous; spores 2, rarely 3, variable in size, 18-24x 30-40 microns.

On *Corylus rostrata*, Scotsburn, Piedmont. *Alnus incana*, *Alnus crispa*, Pictou, Abercrombie. *Ostrya virginica*, Scotsburn.

P. corylea (*P. suffulta* of some authors) is very common in *Alnus incana* in the vicinity of Pictou. It is doubtless widely distributed in this host and on *Corylus rostrata*. This species can be recognized by the naked eye on account of the large size of the perithecia. Besides the true appendages there are numerous densely crowded, short, delicate, hyaline appendages which spring from the apical cells of the perithecium. These appendages at a certain stage become mucilaginous and probably aid in attaching the perithecium to the substratum.

Note on Bohemian Waxwing.

A flock of Bohemian Waxwings, about twenty-five in number, spent the Winter of 1908-9 in the vicinity of Pictou. They appeared toward the last of November and remained till early in March. Mr. Scott Dawson, taxidermist, of Pictou, who first observed them, secured most of the flock for mounting purposes. Two specimens have been placed in the Museum of Pictou Academy and others have been obtained by various provincial institutions. The Bohemian Waxwing is a rare visitant to Nova Scotia, being a bird of more northerly habitat. Only one record of its occurence in Nova Scotia is available, that of Mr. Downs, who reported a small flock near Halifax in 1865.

H. F. MUNRO.

UNIVERSITY OF ILLINOIS-URBANA
3 0112 060956718